

1920—Our Twenty-Fifth Anniversary—1945

# Contractors *and* Engineers Monthly

Vol. 42, No. 5

MAY, 1945

**\$3 a Year, 25 Cents a Copy**

# Covering the Field

## Our 25th Anniversary

## Flood Control

## Tunnel Construction

## State Highway Work

## County Road Problems

## Highway Maintenance

## Reclamation Work

## Airports

## Roadside Development

## Highway Research

Though mainly a behind-the-scenes activity, research men and their work have made possible our present highway system. A brief glimpse of their accomplishments in the past 25 years is given on page 53.

(You will find "In This Issue" on page 4)

# Concrete Slab Checks Wave Wash on Levee

By WILLIAM H. QUIRK,  
Eastern Field Editor

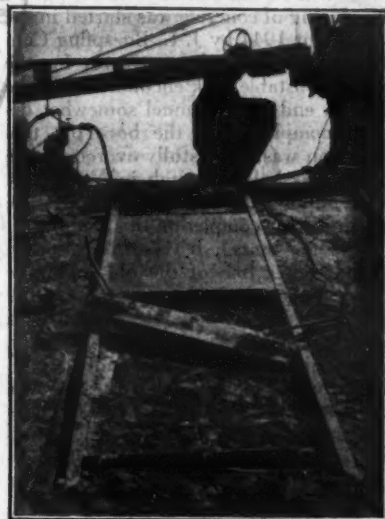
These levees usually had been protected from erosion due to wave wash by the construction of wooden revetments or fences along the toe of the slope fronting on the river. Because of the present lumber shortage throughout the country, wooden revetments could no

## Contractor Places 4-Inch Paving on River-Side Slope Of Mississippi Levee in Southern Louisiana

longer be built, so the U. S. Engineers decided to pave the river-side slopes of the earth embankments with either a 4-inch-thick plain-concrete slab or a 2½-inch slab of sheet asphalt. The many contracts for this work were advertised with alternate specifications providing for either asphalt or concrete. Apparently because of the small volume of the work, asphalt contractors were not interested and failed to submit bids, so all contracts went as concrete paving.

Two outstanding advantages of this slab type of slope protection over the wooden revetments are freedom from destruction by fire, and from loss through theft. Lumber being scarce, there is always a certain amount of pilfering of the boards used in the fencing. U. S. Engineers do not anticipate anyone's prying up and stealing from the levee slopes

(Continued on page 18)



*U. S. E. D. Photo*  
**With the paver riding the levee crown,  
 T. L. James & Co. paved the slopes of  
 the Promised Land Levee.**

# A Short History Of C&EMonthly

**A Look Backward As Well  
As Forward on Our 25th  
Anniversary; Service to  
Readers Always Our Goal**

By THEODORE REED KENDALL,  
Editor

↑ THE quarter-century of service to the construction industry which CONTRACTORS AND ENGINEERS MONTHLY has the privilege of celebrating this month spans the period between two great wars, a period starting with a construction boom, followed by the worst depression known, during which a government-relief agency absorbed most construction activity, and ending with a great boom of war construction. Now standing on a well worn threshold, with little active construction at hand, we look forward to a period of rational financing of needed new highway and heavy construction that will provide a smooth transition from the frenzy of war production and demobilization to a long era of construction for the service of man and the prosperity of our country.

It was in 1919, soon after we were demobilized, that thought was given to establishing a publication that would really serve the highway and heavy-construction industry through text and illustrations, with practical discussions of the how and with what the jobs were built. From Vol. 1, No. 1, which appeared May 20, 1920, our aim has been to serve practical construction and maintenance men. For that reason, we started with innovations based on a very careful survey conducted among contractors from New York to the Pacific. Initially

(Continued on page 70)



**TO THE AMERICAN PEOPLE:**

Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.

We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.

Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.

~~Wm. H. H. H.~~ Williams & Deary  
 Dear Joseph. Act. E. King  
 Dwight & Oliver & C. W. H. H. H. H.  
 H. H. H. H.



# Concreting Methods For Montana Tunnel

**Pumpcrete, Concrete Paver, Weigh Batches, Pneumatic Placer, Rolling Form Used For Placing Tunnel Lining**

By FRANK B. SARLES,  
Western Field Editor

† AT the Northern Pacific Railway's 3,015-foot tunnel under construction between Bozeman and Livingston, Mont., (See C. & E. M., January, 1945, pg. 1) the placing of concrete was started in the autumn of 1944 by J. C. Boespflug Construction Co., Seattle contractor for the tunnel. Unstable rock encountered in the western end of the tunnel somewhat delayed completion of the bore but this condition was successfully overcome, the tunnel was holed through in November, 1944, and concreting operations are scheduled for completion this month.

This new tunnel, driven 100 feet north of the center line of the old main-line tunnel built in 1886, has an 18-foot clear width inside the concrete lining to a point 15 feet above the top of the rail, from which point a 9-foot-radius semi-circle forms the face line of the concrete top. The concrete lining is 1 foot 6 inches thick in the rock section and where bent-rail tunnel lining was used in the timber-lined section. However, where timber lining was used the walls are 2 feet thick. A total of 17,300 cubic yards of concrete was required for the tunnel lining, and 1,660 cubic yards placed in the portals. These figures do not include the concrete to fill up the overbreak which amounted to about 8,000 cubic yards.

## Handling of Aggregates

Sand and crushed gravel, furnished by the contractor, were shipped from Helena and unloaded by a ¾-cubic-yard Speeder crane with a clamshell for trucks for transfer to the stockpiles. The unloading and stocking of aggregates have been under way since the early part of the job and before concreting was begun most of the sand and gravel had been stockpiled in a flat area some 600 feet east of the east portal. The gravel pile was placed in layers, to prevent segregation, the trucks backing onto the pile before dumping their loads in an area parallel to the railroad tracks and 125 to 225 feet north of them.

A driveway about 25 feet wide was left between the gravel and sand piles

and the sand was placed in a similar manner in an area 250 to 325 feet north of the track. The bases of both piles were 30 feet lower than the top of the proportioning bins and 300 to 400 feet away from them. When concreting was in progress, a ½-cubic-yard Speeder shovel was stationed in the driveway between the piles to load the trucks which hauled the aggregate to the batching plant. A crane was used for this work at first, but only until the shovel could be rigged up, as handling by crane tends to increase segregation.

## Proportioning and Mixing Plant

The three-deck proportioning and mixing plant was constructed against the north bank of the entering cut about 300 feet east of the east portal. Built of heavy timbers, the plant was designed for multiple use, as a mixing plant fed from the weighing batchers above, or to by-pass the mixer and deliver weighed batches to trucks for haul to the paver used at the west end of the tunnel.

The first deck, 10 x 20 feet in size, was 10 feet above the ground. On the west end of this deck was placed a Smith 1-yard mixer with Waukesha engine, facing so it could be charged by a chute from the weighing batchers above and discharge mixed concrete to the west. The movable chute attached to the deck above could be swung to discharge the weighed aggregates into this mixer or into trucks driven along the roadway on the south side of the structure in the track area leading to the portal.

The second deck, 8 feet higher and of the same size, provided a working platform for the operator of a Butler 3-beam weighing batcher. The top of the water tank on the mixer protruded through the southwest corner of this deck which was further obstructed by a 24-inch steel pipe passing diagonally through it for the delivery of cement from the top deck to the concrete mixer.

The third deck, 16 feet higher, was level with the natural ground at the top of the cut and extended to the north, forming a nearly level ramp over which the dump trucks backed to deliver sand and gravel to the Butler steel bins with wooden extensions on their tops flush with the third deck. These extended bins held 20 cubic yards of sand and 30 of crushed gravel and discharged by gravity into the weighing batchers below.

(Continued on page 29)



Public Roads Administration Photo

Twenty-five years ago, many state highways looked like this.

# Our State Highways, Past, Present, Future

**From Waterbound Macadam To Multiple-Lane Pavements On Expressways Is Our Progress in 25 Years**

By HERMAN A. MacDONALD, Commissioner, Massachusetts Department of Public Works, and President, American Association of State Highway Officials

† WHEN one accumulates age, one looks backward through the vista of years that are gone to that early period in his or her span of life. The practical man looks only to the present; while the young man looks with a prophetic eye to the future and tries to figure out what it holds in his particular field of endeavor. A review of our highways, past, present, and future, for this Twenty-Fifth Anniversary issue of CONTRACTORS AND ENGINEERS MONTHLY is a large order, as I am not a seventh son of a seventh son—a prophet. But this period in our highway history seems a logical time to take stock of the past as well as to look towards the future.

First, let us turn the calendar back to the years 1919 and 1920. You will recall that the first World War, the war to make the world safe for democracy, had just ended the year before. It was also about the time that Federal Aid for highways had actually begun. Mass production of motor vehicles was just in its infancy. The gasoline tax had not yet got a start. Dirt roads and waterbound-macadam roads and a few black-top roads were the latest in highways, and only in urban centers were there any hard-surface pavements. We were learning the hard way that our highway system was totally inadequate to meet the fast-growing needs of motor-vehicle traffic. We were beginning to learn also that what highways we had were too narrow and too short. The great program to take rural communities out of the mud had hardly begun. Almost overnight, however, the highway construction industry became one of the great industries of the nation, and better still, through the gasoline tax, registrations, and license fees collected, it was a self-liquidating business of great magnitude almost from the start. State highway departments were being fairly well organized throughout the nation at that time. The Massachusetts Department, one of the first states organized, this year is celebrating its fiftieth anniversary.

In 1920 there were a little over 9,000,000 motor vehicles in the country, compared with 35,000,000 in the peak year of 1941. Paved or dustless roads amounted to 18,700 miles throughout the nation in 1920, in contrast to 331,000 miles in 1944. In 1920, signs on

highways, "Sound your horn," were not uncommon, and the elimination of curves and grades and railroad grade crossings was given very little consideration. Limited-access roads, divided roadways, traffic-control lights, acceleration lanes, channelization, and traffic interchange facilities did not exist even in the imagination a quarter of a century ago. Highways at that time had not begun the process of replacing branch railway lines and electric car lines, while buses and trucks had not started to take over from the railways a large portion of inter-city and inter-state passenger and commodity transportation services. So much for the good old days of 1920 in the field of highway expansion.

## Today's Modern Highways

The highway situation of today is an open book for him who travels to see. Great advances have been made in twenty-five years in separating fast, through travel from purely local travel, in eliminating cross travel at intersections, in securing sufficient sight distances, in eliminating excessive curves and grades, and, generally speaking, in making highway transportation efficient and safe. Yet, a tremendous amount of work needs to be done to make highway transportation still safer and more efficient. Old turnpikes which knew the rumble of stage coaches in the early history of our nation have been reconstructed to high-speed expressways on which modern motor vehicles may travel with safety and speed, the two most important objectives. Travel at some intersections is now carried on at three different levels, without which traffic would be in a continuous tangle.

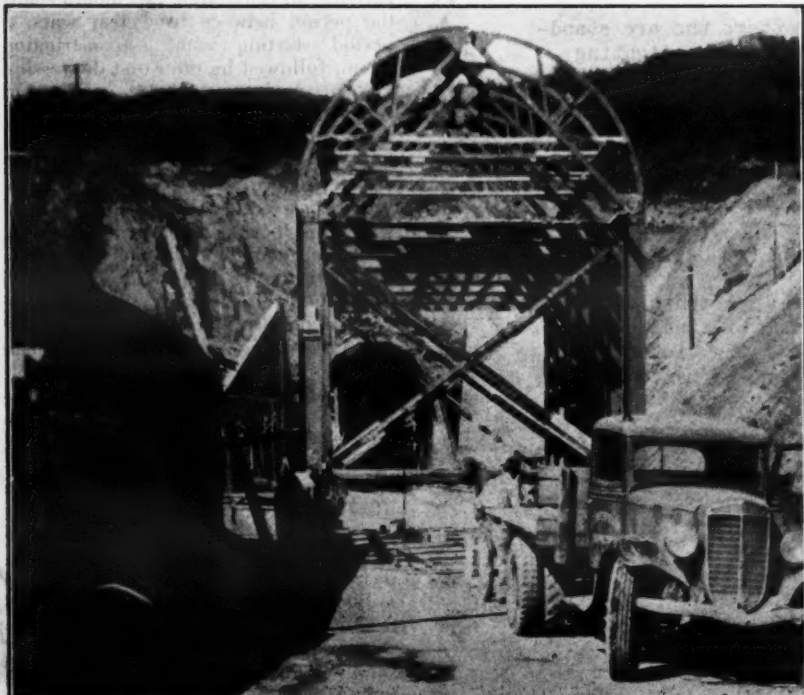
The past four years have seen this system of highways sadly neglected because of war conditions. It will be the first duty of every state to restore these highways to the highest maintenance standard as promptly as possible after the war.

In all probability the greatest need of highway development today is to take care of urban congestion which is very real and must be solved, without too much delay, if highway transportation is to be the efficient method of transportation that it ought to be and must be for the national welfare. Let us now pass from the present to the highways of the future.

## What of 1970?

What will be the status of our highways twenty-five years from now, in the year of Our Lord 1970? Great changes are possible in the span of twenty-five years. Think of all that has happened in the past quarter of a century—great

(Continued on page 79)



The rolling tunnel-lining forms were a feature of the concreting of the Bozeman, Montana, tunnel for the Northern Pacific Railway.



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over the years



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CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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## Maneuver Damages to Roads Vs. Army Combat Advantage

Vast areas in Louisiana, Texas, and Tennessee have been used in the past four years for the training of combat troops and mechanized units in large-scale maneuvers. Extensive damage to state and local roads was the natural result of the passage of tanks and heavy trucks over highway surfaces not designed for such loads. Hasty deploying of mechanical units over level areas, leaving the roads quickly over soft shoulders, worked havoc. Finally, the use of gravel-surface roads during weather conditions which greatly weakened them caused damage to these routes and local paralysis of traffic.

It has cost the State of Louisiana well over \$1,000,000 to repair the major obvious damage to its roads, and much additional expenditure will be required as higher-type roads which just "lasted out" the maneuvers begin to fail prematurely in the next few years. The discomforts of the rural population, as well as the methods of highway repair, are told in an article in this issue by our Eastern Field Editor, after a tour of the area.

Has the breakdown of highway transportation facilities for a period of over a year in such a large section of Louisiana been justified? Probably the best answer to this question is found in a letter

dated January 7, 1945, from the headquarters of Lieutenant General George S. Patton, Jr., commander of the Third Army on the western front in Europe, and which trained in this area in Louisiana in 1941, to Don M. Ewing, Associate Editor of the *Shreveport Times*, released March 2 by the Associated Press. How an armored-division night march during the 1941 Louisiana maneuvers was an important factor in turning the Germans' south flank in the Battle of the Bulge was revealed in General Patton's letter as follows: "I recall very well our trip through the night; and I can assure you that our success, particularly in the present operation, has been due to the ability of our people to move rapidly at night."

Here in the States we have suffered little from the effects of the war. There has been no devastation of cities and homes, and only a slight reduction in the availability of necessities; transportation has suffered some delays. It is only in the maneuver area that the people have known what real damage military equipment can do to highway transportation. A mere \$900,000 for repairs, plus the local discomfort of the rural population, was a small price to halt the enemy break-through in Belgium.

## Sorry! The War Is Not Over; Stringencies Are to Continue

A wealth of evidence is piling up that we are not going to have any easy time this coming year in the equipment field. The shortages which have worried us since Pearl Harbor will still exist, even if Germany folds up while this editorial is on the press. The job of defeating Japan in China, the task our men released from Europe will undertake, will require the continued supply of munitions and trucks and tires to carry troops over that vast country.

What are the stringencies we face as an industry and as a people? First, there is the information that high Navy officials are expressing great concern over the spare-parts shortage. According to a Navy release, the shortage of spare parts has worried government procurement agencies for many months. Fleet Admiral Nimitz says, "A constant flow of spare parts to the fleet is necessary immediately."

Lt. Col. Thomas Riley, USMC, who was sent to Washington from the Philippines to solicit aid, said landing operations in the Pacific have been endangered by the shortage of parts for cranes, bulldozers, and other equipment. "For the Peleliu invasion, spare parts had not arrived when we were ready to start," Lt. Col. Riley stated. "All our cranes were ready to unload, but we had

to strip three of them in order to get parts to be sure the rest would work. Many thousands of dollars worth of equipment is immobilized in advanced areas for want of spare parts."

Navy officials advise that in the early part of the war large stocks of spare parts were ordered. Experience has proved some types of spare parts are not needed in large quantities and that other types are readily expendable. It is this latter group about which the Navy is concerned. Spare parts for the following types of equipment are vitally needed, according to Navy officials: trucks, shovels, cranes, tractors, wagon drills, and similar equipment. Army officials similarly advise that there are quantities of certain types of spare parts available and a critical shortage in others... such a condition is inevitable because requirements are as unpredictable as war itself.

Then comes the pneumatic-tire situation. The Office of Price Administration has announced that only 1,000,000 tires were available for rationing in April, as compared with 1,600,000 in March. All tire ration certificates dated earlier than December 1, 1944, were canceled on April 1. While the highway and heavy-construction industries are not engaged in an active construction program now, there is still great need for tires for

trucks and other maintenance equipment used by state and county highway departments and for contract maintenance. There is no assurance that, with the end of the European phase of the war, there can be any increase in the number of tires available for essential highway-maintenance activities.

The third situation which we view with alarm is the critical condition of freight transportation. Office of Defense Transportation Director Johnson has warned that it will be impossible to haul the traffic volume that was handled last year unless shortages of man-power and equipment on railroads are relieved soon. The Government Policy Committee on Occupational Deferments has recommended an extensive increase in exemption for key transportation workers under thirty, but this does not produce more locomotives and freight cars, both of which are wearing out rapidly under the tremendous demands of war traffic. It is not going too far to state that we are facing a breakdown of freight transportation not unlike the experience in 1918 when the railroads were nowhere nearly as well prepared for their task as they were in 1941. Breakdowns in 1918 came much more quickly because of lack of preparedness, while today it is the lack of replacements that is creating the critical situation.

The possibility that further freight transportation may be thrown upon the highway transport units of the country creates further problems for the highway and heavy-hauling industries. An increased use of our highways, which have deteriorated greatly through lack of full maintenance in the past four years, and the lack of sufficient addi-

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tional tires for heavy hauling will greatly restrict the ability of highway transportation to handle any increased burden placed upon it by the deterioration of railroad freight transportation.

It is absolutely essential that we do everything possible to prolong the life of our diminishing supply of motor vehicles and tires. The President stated March 26, 1945, "Every day that the war continues, domestic transportation becomes more important to the American war effort and our essential civilian economy."

America is just beginning to feel the effect of the war through increased casualty lists, further restrictions on food, and the threat of a breakdown in railroad and highway freight haulage. This means keeping our chins up, tightening our belts, and not missing one opportunity to continue the economical wartime maintenance of our highways, our motor trucks, and our tires.

## CONTRACTORS AND ENGINEERS MONTHLY—1920-1945





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In addition to Bulletin E-24 — "Soil Stabilization Methods" — Seaman is publishing short supplementary bulletins containing the most up-to-the-minute engineering information from airfield and highway construction work. Ask for Series "Fresh From the Field."

The great success of the SEAMAN handbook "Soil Stabilization Methods" has led us to feel that all new material should be published immediately rather than held for new editions of the book itself. So, Seaman engineers plan to issue new information in brief bulletin form; not regularly; — only as occasion demands.

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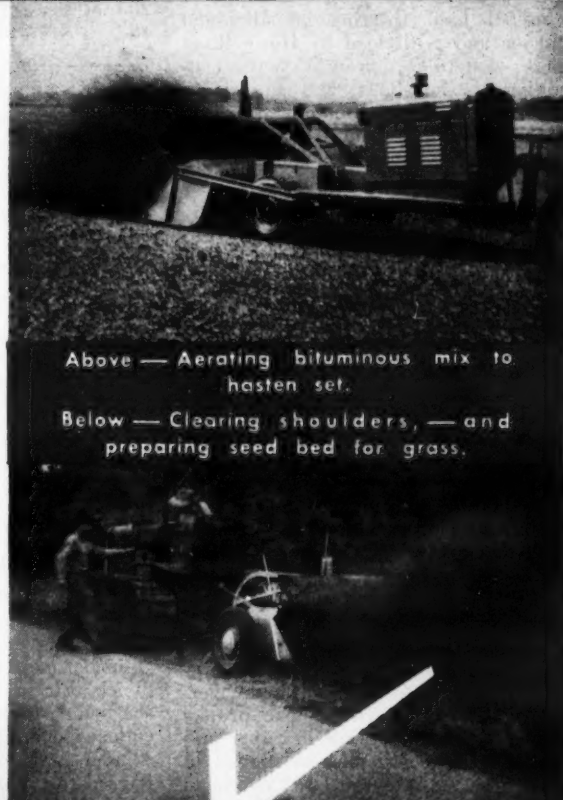
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- ☐ Pulverizing old, rough sod to level and prepare for re-seeding.
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- ☐ Pulverizing hard, frozen snow drifts.
- ☐ Pulverization of scarified, old bituminous material to reduce to original aggregate size for re-mixing.
- ☐ Removing ice from runways, streets, highways.
- ☐ Roadside mulching.
- ☐ Pulverization of soils prior to compaction in earth work.

Above — Aerating bituminous mix to hasten set.

Below — Clearing shoulders, — and preparing seed bed for grass.



C-107





# Wayne County, Mich., Depot Is Large, Well Organized

## Equipment Repaired and Overhauled in Central Location; Asphalt and Concrete Batching Units

THE main yard and shops of the Wayne County Road Commission are located at Wayne, Mich., in the central part of the county. Although the Commission maintains four other yards strategically situated throughout the county, all equipment which services the 2,300 miles of streets and roads in the county system is overhauled at the main yard. The smaller yards are used mainly for materials, supplies, and equipment storage.

Wayne County, which includes the city of Detroit and its 115 miles of county roads, has about one-quarter as much mileage as the Michigan state highway system and about 40 per cent of the population of the state. The maintenance garage at Wayne occupies 7 acres of land fronting on Michigan Avenue and is divided by Howe Road into a western section of 2.5 acres, containing six buildings, and an eastern area comprising the remaining 4.5 acres where the asphalt plant, concrete batching unit, and equipment and material storage are located.

### Main Building

The main building has a 165-foot front on Michigan Avenue and is 180 feet deep. Originally this building was two separate structures, an east and a west shed of equal width separated by a 33-foot areaway. This middle portion was subsequently roofed over, a floor installed, and the adjoining side walls removed, making one large building with brick walls, concrete floor, and a composition roof supported by steel trusses. Equipment enters this structure from the rear or south end through two 25-foot sliding wooden doors and exits in the same manner, although there is also a 12-foot-wide overhead door at the north end of the building. Tall windows assure good natural light around the sides of the building while the interior area is illuminated by an adequate overhead electric-light system. Fire protection is furnished by Buffalo Super and by Fomon fire extinguishers spotted in convenient locations. Two overhead monorails run the length of the shop and are equipped with 1-ton chain hoists.

### Laboratory

In the northeast corner of the building, enclosed within cinder-block walls, is a 30 x 35-foot laboratory where the materials used in road building are tested. Concrete cores from highways are crushed by a Tinius Olsen compression testing machine which has a capacity of 100 tons. Test cylinders of concrete are cured under hot and cold sprays in a moist curing cabinet. The ductility properties of asphalt are tested

on another machine, while a Rotarex centrifugal extractor removes the bitumen from asphaltic or tar mixes for other tests.

### Machine Shop

Directly south of the laboratory and along the eastern wall of what was formerly the east shed is a 30 x 50-foot machine shop closed off from the rest of the building by a cinder-block wall. This wall was installed to keep dirt and dust in the rest of the building from blowing on delicate machine parts. A work bench for the machinists runs down the center length of the enclosure which is illuminated by six overhead fluorescent lights. A monorail equipped with 1-ton and 3-ton chain falls makes a circuit of the shop. The machine-shop equipment is closely grouped around the sides, enabling the machinists to carry on more than one operation at a time.

This equipment includes a 36-inch x 20-foot heavy-duty LeBlond lathe, an 18-inch x 16-foot American lathe, and



The western section of the Wayne County depot at Wayne, Mich.

an 18-inch x 6-foot Boye & Emmes lathe. A well used tool is the No. 3B Milwaukee milling machine together with a 24-inch American shaper. There are an 8-inch Black & Decker grinder for sharpening tools, a Greenfield Universal cutter grinder, and an old Army surface grinder. A Greenard No. 31½ arbor press is used for pressing on bushings, while a single-spindle medium-size drill press will make holes up to ¾ inch in size. A Niles-Bement-Pond radial drill and a 6-inch Peerless hack saw complete the equipment.

The rest of the eastern section of the building is given over to the repair of pumps and mowers. Wooden benches for the machinists are placed along the eastern wall south of the machine shop, and are equipped with vises, air outlets, and small tools. A wire-enclosed 25 x 45-foot stock room contains the necessary parts for all repairs made in this

(Continued on page 35)



In 1944, dirt for levees was moved speedily by such equipment as this dragline with perforated bucket loading a Euclid at Bolivar, Miss.

## Uncle Sam's Levees Control Our Floods

### Flood Control Act of 1917 Started Unified Program Of Levee Building; Part Played by Equipment

By CHARLES SENOUR, Head Engineer,  
Mississippi River Commission

ALTHOUGH flood control was of necessity practiced almost from the beginning by those who had had the hardihood to invade the flood plain of the lower Mississippi, it was not recognized as a legitimate activity of the Federal government until 200 years after De La Tour had laid out a levee system for the young settlement of New Orleans. In the meanwhile, quite an extensive levee system had come into being along the fronts of the great basins between Cairo and New Orleans, principally through the efforts of planters, individually at first, and then in association with one another.

The record was one of incredible perseverance and staggering reverses. The levees were never high enough. As their confinement of the river's flow became increasingly effective, stages attained greater and greater heights. And so we read of 284 crevasses in the flood of 1882, with a combined length of 56 miles; of 53 in the flood of 1890; and so on until one marvels that those who built them had the heart to carry on. What the figures that record the breaks

and the extent of the inundations fail to depict, of course, are the prosperous years that intervened between the great floods; the bountiful harvests and the increasing development; and, not least perhaps in the list of factors that kept them in the battle, a merciful ignorance of what very large embankments their levees were destined ultimately to be.

The Mississippi River Commission entered the scene in 1879. It recognized that successful flood control could be had only by building adequate levees, but the law of the land as it was then interpreted did not permit the Federal government to participate in the construction of levees save to the extent that they might be held to aid navigation. Quite a number of levees were built during this period with Federal aid; and if not all of them contributed very directly or very noticeably to the improvement of navigation, it is not for us here to question the singleness of purpose of those who sponsored them. "There were giants in the earth in those days."

Flood control in governmental circles had somewhat the same standing as did birth control in social circles. There was conflict between propriety and ne-

(Continued on page 89)



The early history of levee construction along the Mississippi River is shown in this series of photographs taken from 1890 to 1921: 1890, moving dirt by wheelbarrow at Morganza Crevasse in Louisiana; 1913, mule-drawn scrapers at work near Bolivar, Miss.; 1921, levee enlargement at Bachelor Bend, Miss., with a steam-driven tower machine.





## Portraits in Print

By BILL QUIRK

### Herbert M. Hale, Project Manager, Reviews Progress in Construction

✦ DURING the present lull in the heavy-construction industry between the tapering off of the frenzied wartime building and the beginning of post-war construction, Herbert M. Hale, managing engineer for many a big construction project, marks time in his peaceful retreat at Orient, a tiny village at the northeastern tip of Long Island, 110 miles from New York City. Since the completion in 1943 of the huge Bayonne, N. J., dry-dock for the U. S. Navy, a project managed by Hale and which employed some 4,500 men at the peak of construction, he has been living quietly with his hobbies—painting in oils, portrait photography, woodworking, furniture making, and allied handicrafts. When the war is over and the nation turns to peacetime tasks, Hale will again be found managing the construction of some important project. Until then he is content to work with his hands, fashioning creations of beauty and utility, until the call comes to direct men, materials, and machinery in some public improvement on the grand scale.

Practically all the construction jobs on which Hale has worked have been big—subways, tunnels, power stations, hydro-electric plants, heavy foundations—and by operating as a free lance he has been able to pick his jobs. Since 1904, when he was graduated magna cum laude from Harvard University with a civil engineering degree, Hale has been wrapped up in heavy construction. He has seen that industry reach its greatest development during the quarter century between the two World Wars through the use of new machinery and products and improved methods of construction.

"Take tunneling for instance," said Hale who has dug many miles of tunnels in the East. "Prior to the first World War when we were digging the Catskill Aqueduct tunnel to supply New York City with water, we used the old 'slugger drill', a heavy cumbersome tool that had to be mounted on a tripod and took several men to operate. Drilling dynamite holes with the 'slugger' was a slow process. Over the years, drills have been greatly improved. The 90-pound shaft-sinking drill with self-rotating bit, the forerunner of the present-day jackhammer drill, was developed. This was followed in a few years by a drill with a hole down through the center for water to flow through and keep the drill point clear of the cuttings. Drills became lighter and easier to handle and with the present carriage mounting they can be put to a great variety of uses."

Herbert Hale took time out for a few minutes from a woodworking job he was doing in the compact little shop adjoining his garage, and lit the pipe that is seldom out of his mouth, and which seemed to help him turn the clock back twenty-five years to the days when the present modern machines of construction were non-existent or else a novelty. A square jaw, friendly brown eyes, and a pink skin are one's first impressions of the veteran constructor. The hair has gone from the top of his head, but a fringe of grey is around the sides. At 62 he carries his 5 feet 8 inches of height and 170 pounds trimly erect, and swims almost daily in Long Island Sound from May until mid-October. That and croquet he finds an ideal combination for keeping fit.

#### Tunnels and Concrete

"But there is more to tunneling than just drilling," Hale continued. "The early explosives were very gassy and much time was lost after the blast wait-

ing for the fumes to clear away. Naturally you could not shoot too much dynamite at a time. Now, thanks to modern machinery and the advances made by the powder chemists, we can drill, load, and shoot a heading covering the entire cross section of the tunnel at once with the use of delayed exploders instead of blasting it out by the old heading and bench method. Mucking, which was formerly done by hand, is now a machine operation. I recall making a trip to Georgia to see the first Myers-Whaley mucking machine in action on a tunnel job; that and the Conway mucker have done away with the slow costly

hand-labor method of removing muck which was prevalent in the early days.

"The old way of ventilating with blowers, which only scattered the foul air along the length of the tunnel, has been replaced by exhaust fans which remove the fumes and powder smoke through pipes directly from the heading. The tempo of tunneling has been speeded up, construction is safer, and requires fewer men. Those fewer men receive greatly increased wages, of course, but even so the total cost to the taxpayer for tunnel construction is not much greater, and he gets his tunnel so much quicker. A driller formerly received \$4 a day while now he gets \$12, and the mucker who got \$2 is now paid \$8 for a day's work on the mucking machine. With the use of better steel in drills, the job of 'nipper', who kept the drillers supplied with drills, has been reduced to the minimum. Construction labor, though fewer in number, enjoys higher wages, while the community benefits by getting a job done in faster time at no material increase in cost.



Herbert M. Hale.

"Another great improvement in construction," Hale reflected as he puffed his pipe, "is the method of transporting concrete. In the old days of placing con-

(Continued on next page)

## MOBIL-IZE FOR SPEED!

Put Your Jobs On Wheels With  
Lorain Rubber-Tired Shovels and Cranes

Moto-Crane erecting steel.

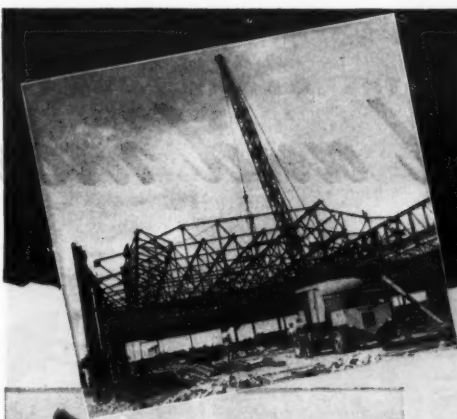
IN a fast moving postwar world, speed will be the key to greater construction profits—speed on the job—speed to cut time lost moving between jobs—and speed in converting equipment from one kind of work to another. Lorain rubber-tired shovels and cranes will help you get there fast—do it fast—and change to the next job fast!

#### TWO TYPES OF RUBBER-TIRED MACHINES

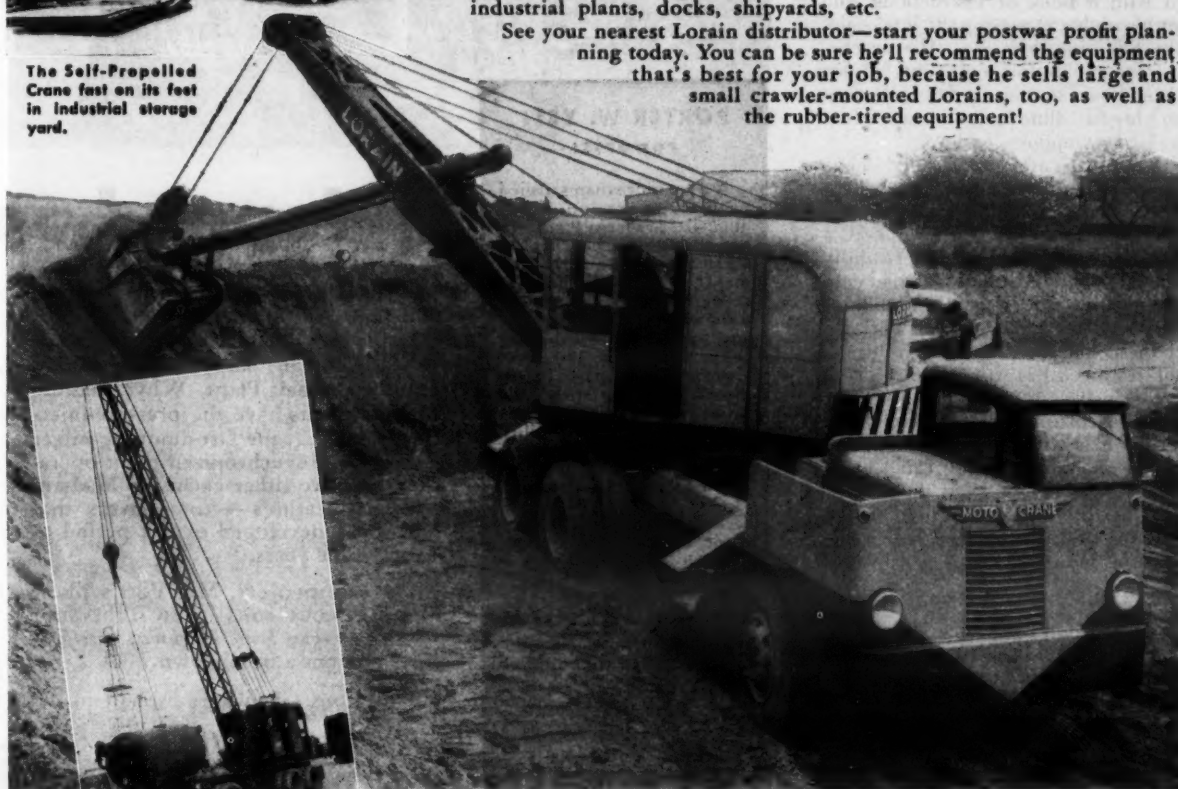
Moto-Cranes and Shovels feature 30 MPH speed between jobs, 15 and 20 ton capacities and high on-the-job efficiency. They are available in both 4 x 6 and 6 x 6 (front-wheel drive) model.

The Lorain rubber-tired Self-Propelled Crane is operated and propelled by a single engine and single operator. This new unit has high local mobility, with speeds up to 7 MPH for quick shifts on location, and 20-ton crane capacity, and a handy carrying platform, ideal for industrial plants, docks, shipyards, etc.

See your nearest Lorain distributor—start your postwar profit planning today. You can be sure he'll recommend the equipment that's best for your job, because he sells large and small crawler-mounted Lorains, too, as well as the rubber-tired equipment!



The Self-Propelled Crane fast on its feet in industrial storage yard.



The Self-Propelled Crane transports its own load.

A Moto-Shovel is fast on the job—and between jobs.

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## Herbert M. Hale, Project Engineer

(Continued from preceding page)

crete by hand, on a tunnel-lining job only from 40 to 50 feet of forms could be built at a time, as there was barely enough room in such close quarters for the handling of concrete, to say nothing of the men required to place it. Now, with the pneumatic method or by pumping it through pipes, concrete can be placed in tunnel forms built over 100 feet long more quickly, at less cost, and with better results. The widespread use of truck-mixed concrete is another innovation that has caught on with great popularity in the last couple of decades of construction."

### Builder Beginnings

Herbert M. Hale got his start in construction when as a boy in Somerville, Mass., he worked in his father's carriage-building shop, learned the use of tools, and acquired a taste for the smell of wood which he has never lost. After graduation from Harvard, young Hale went to Chicago for a few months, in a minor engineering capacity with the Pennsylvania Railroad, on some track elevation work. In the following year, 1905, a large amount of subway construction was under way in New York, attracting engineers from all over the country who came to the metropolis seeking experience in this new field. Hale came to New York with the rest and worked for the old Rapid Transit Commission on the construction of the Fort George tunnel section in uptown Manhattan. Another great civil-engineering construction project, the Catskill Aqueduct, started the following year and in 1907 Hale left subway construction to work for the New York City Board of Water Supply on original design.

One day while passing an east-side pawn shop Hale was attracted by a shining flute in the window. Before he knew it, he had purchased the musical instrument with a book of instructions, and spent his nights mastering the intricacies of the fingering and stops. His practicing drove the fellow occupants of his rooming house to despair, but Hale went on to play first flute for two seasons in a New York symphony orchestra.

His musical career terminated, however, when he gave up his position of designer in the office for outside tunnel work on the Roundout Valley siphon, a part of the New York City water-supply system. He continued on this tunnel construction from the Catskill Mountains down under the streets of New York. In 1911 the contracting firm of Holbrook, Cabot, Rollins & Fry was awarded a contract to construct a tunnel for this water line from Fourteenth Street, Manhattan, under the East River into Brooklyn, and Hale was offered the post of Chief Engineer. He accepted, and left the employ of the City to put his knowledge of tunnel construction at the disposal of the contracting industry.

### 14th Street Caisson

"That was an interesting job," said Hale. "We sank six shafts to dig that tunnel, four of which were over 750 feet

deep. The structure was known as a pressure tunnel, for it was cut through solid rock which in reality is what stands the internal pressure. To get to rock from the ground surface, we had to pass through an unstable stratum of water-bearing soil for as much as 100 feet. The only way to do this was by building a caisson and sinking it into the ground. We built this caisson 75 feet high and 24 feet outside diameter with 2-foot-thick reinforced-concrete walls. As digging progressed under air pressure within the caisson, the big structure sank and as it did we added more height to the walls.

"The unusual-looking caisson created a lot of conjecture around one shaft in Brooklyn," Hale related with a laugh. "Two lawyers were watching the construction and remarked on its height. After a few days of digging the two came by again and noticed the top of the caisson was not as high as it was. One lawyer decided that the contractor had made a mistake and built the caisson too high, and as a result had to take

some off the top. The other lawyer contended that no mistake had been made but he could not understand how the missing segment of cylindrical caisson had disappeared. A bet between them ensued, to be settled during lunch at the club. I had to explain to them how wet soil is excavated and how the caisson sank accordingly, in order to convince that one lawyer that no error had been made in construction."

When the water tunnel was finished, the company got a contract for subway construction, so Hale returned to his early field to help build a section on the Broadway line of the B.M.T. that burrows under Times Square. Other big jobs followed, including the post of Construction Engineer on the hydro-electric development of the International Paper Co. at Glens Falls, N. Y., and the building of the Fourteenth Street power station of the New York Edison Co., at that time one of the largest steam plants in the country. On this job Hale served as Assistant to the General Superintendent.

### More Subway Work

In 1928 New York City began construction on the Nassau Street Loop of the B.M.T. subway. The low bidder on this job was the Marcus Contracting Co. Construction was complicated in this downtown Manhattan street where the clear width between building fronts is only 32 feet. Spencer, White & Prentiss was called in to supervise the contract and to underpin the tall buildings on each side of the street. They put Hale in as Managing Engineer on this job.

Later he was called in to manage another job for Marcus on the Marcy Avenue subway in Brooklyn. Here the contractor had gotten into a series of difficulties, progress was slow, and Hale found himself in the role of trouble shooter.

"That place was a mess," Hale reflected. "It was no wonder that they were bogged down. Once we got the place cleaned up, everything went along smoothly, proving once again that if a construction job is neat and orderly,

(Concluded on page 48)



## ...depend upon Madsen

When Porter W. Yett wanted speed and more speed to mix 100,000 tons of asphaltic concrete for the Henry J. Kaiser Company shipyards, he chose a Madsen Asphalt Plant. Why? Because Madsen plants have the pressure-injection system... the fast-dumping mixer gate... the synchronized plant operations and five other exclusive Madsen-patented features — time-savers that have been developed over a period of twenty-nine years.

On one project, Mr. Yett's plant mixed 33,000 tons in 26 light-hour days to Oregon State Highway specifications without a breakdown.

Only tons talk where asphalt plants

are concerned — here's what other Madsen Plant owners report:

"It is not unusual to mix in excess of 200 tons per hour with our 3000-lb. Madsen plant."

"We produced 149,121 tons in 8 months with our 3000-lb. Madsen Plant."

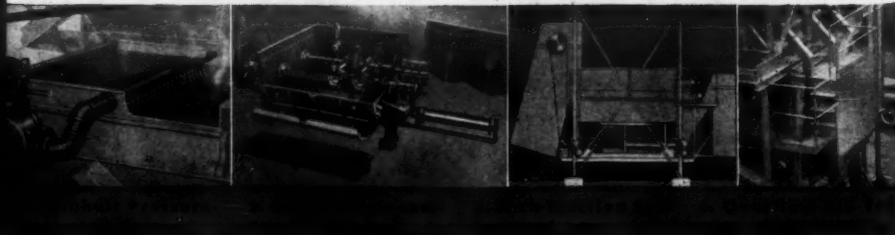
"We mixed 75,920 tons from October 1 to December 8 with our 3000-lb. Madsen Plant."

"We have consistently mixed 3500-lb. batches with production reaching 200 tons per hour."

Bona fide letters from which these excerpts were taken are available. Plan for tomorrow today; write for the new Madsen plant catalog — MP-120.

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FOR THE SUPERIORITY OF **MADSEN** ASPHALT PAVING PLANTS



For  
68 Years  
Builders of Fine  
WHEEL BARROWS:  
**AMERICAN**  
STEEL SCRAPER CO.  
Sidney, Ohio  
Watch for  
Post-War  
Models





Official U. S. Army Photo  
The new light-weight all-aluminum bridge developed by the Army Engineers for speedy construction over swift rivers.

## New Aluminum Bridge For Engineer Units

A new all-aluminum 50-ton floating bridge, which is lighter, wider, and capable of faster construction than any pontoon bridge in service at present, is now being used by Engineer units overseas. This new structure was developed by the Corps of Engineers, Army Service Forces, to handle the increasingly larger and heavier loads on military bridges, and is designated as the M-4 bridge.

Comprising but three main parts, the bridge is so simple in design that a 301-foot section was constructed in 2 hours and 12 minutes in its first service test, including the time needed to unload from the trucks. Since that time, 45 minutes has been knocked off the erection period. The three major bridge parts, each of aluminum, are: (1) a hollow deck balk, (2) removable gunwales, and (3) half pontoons.

Two half pontoons, each 30 feet in length and weighing only 1,700 pounds, are locked stern to stern with connector pins to form a complete pontoon which alone will safely support 26 tons. The bow of each half pontoon has been designed to an "ideal curve" to enable it to ride swift currents. Removable gunwales attached to each pontoon provide a foundation for the deck balk which is fixed in place with lugs and pins.

The hollow aluminum deck balk, which replaces both the balk stringers and chess flooring used in the older-type wooden-decked bridges, is in itself an innovation in bridge engineering. Fifteen feet in length, 9 x 9 inches in cross section, and 215 pounds in weight, a single deck balk may be loaded easily by four men; yet afloat, it supports a 300-pound load. Placed parallel to the flow of traffic, the balks are staggered to distribute the load, making the entire deck a continuous beam. The top surface of

ing itself is so buoyant that if every pontoon were sunk, the deck alone could still support a loaded truck.

One M-4 bridge set provides approximately 436 feet of floating bridge and 180 feet of fixed bridge, or a total of 616 feet. A "set" is carried in sixty-nine trucks and trailers, with each of sixty-four trucks of 2½-ton capacity carrying sufficient equipment to build 15 feet of bridge. Two 6-ton trucks with semi-trailers transport D7 tractors while three 4-ton trucks carry twin-screw power boats. In addition, five Quick-Way cranes accompany each bridge set.

Tactically, the M-4 bridge is used primarily in attack, with Engineers constructing the bridge in a rapid follow-up to the assault-boat crossing. In theory, the M-4 remains in place no longer than four to five days and is replaced by either a Bailey bridge or a timber trestle bridge so that the M-4 may be moved forward for new attack crossings.

The deck of the new bridge is 150 inches wide between curbs, nearly 2 feet wider than present military bridges. De-

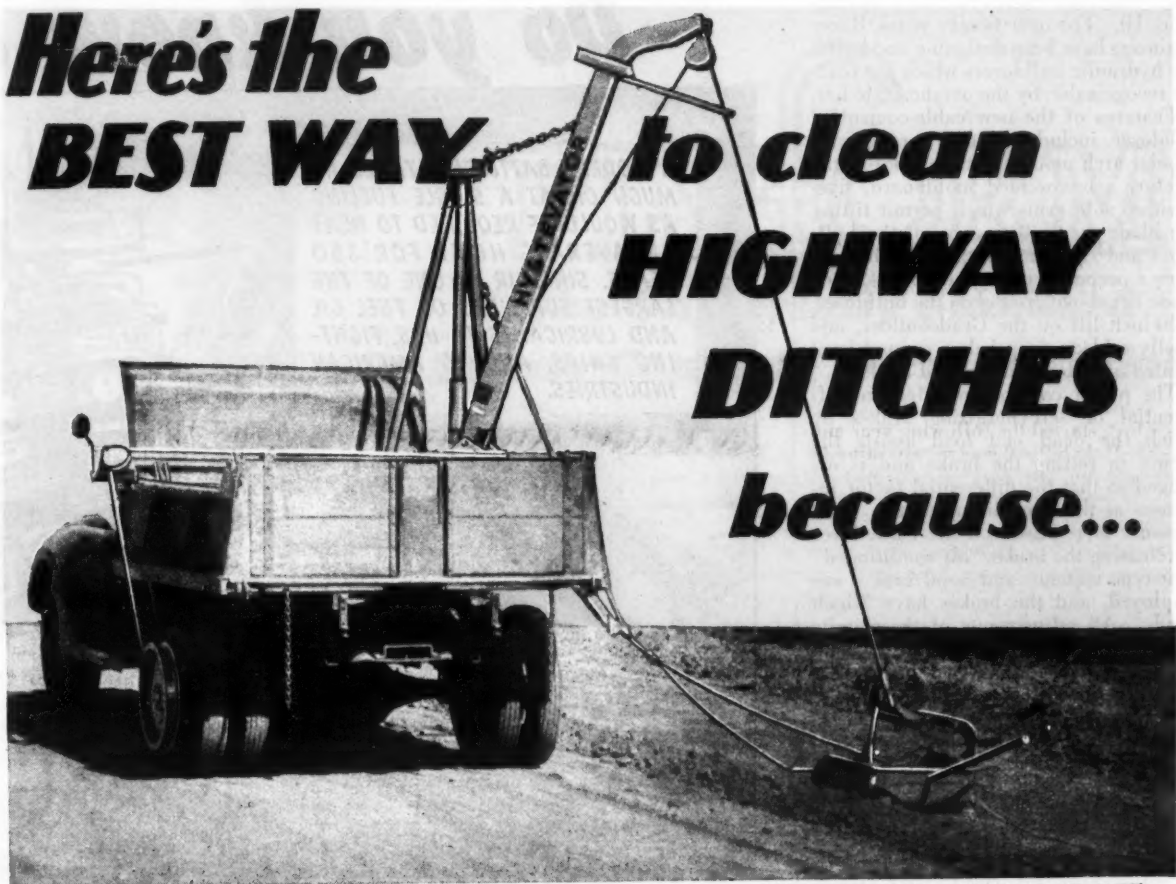
signed and tested to carry with safety a 50-ton vehicular load in a current as swift as 10 feet per second, the bridge can carry even greater loads in slower currents.

The new bridge eventually will replace several older types. The use of the half pontoons alone allows the rapid building of a lighter bridge; and trestles and pneumatic floats in each set permit the construction of bridges over narrow ravines, or in water too shallow for the use of the aluminum pontoons.

## Mall Names Thorp Co. As Eastern Distributor

The Mall Tool Co., Chicago, Ill., has announced the appointment of the John N. Thorp Co., 50 Church St., New York 7, N. Y., as its eastern distributor. The products to be handled by the new distributor include gasoline, pneumatic, and electric chain saws, portable electric saws and drills, flexible shaft grinders and sanders, and concrete vibrators and surfacers.

# Here's the BEST WAY to clean HIGHWAY DITCHES because...



... the inexpensive HYSTEVA TOR Scraper Assembly eliminates multiple hand shoveling, while it triples load output per truck. All that's needed is a two-man crew — the truck driver and the scraper operator. It's that simple.

The HYSTEVA TOR fits any standard dump truck; converts it into a self-loading unit. It's easy to install or remove. No power plant or truck motor take-off is required. The simple drum attached to truck's left, rear wheel provides the hoisting power. The "guided" load is dumped anywhere in truck by rope operated trip latch.

Two widths of scrapers available — 24" width and 12" width, to provide for varying ditch widths.

The wide, curved blade leaves ditch of uniform contour.

# HYSTER Company

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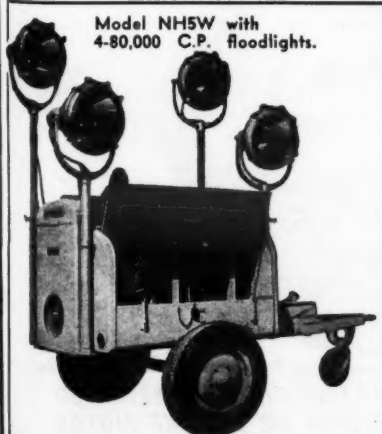
1852 North Adams  
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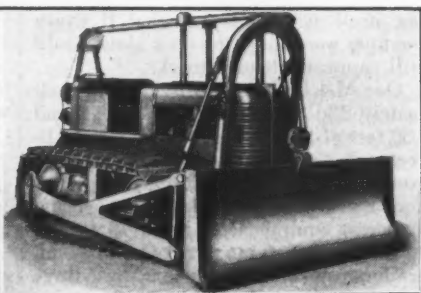
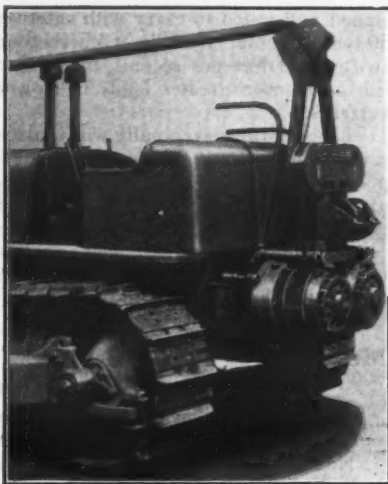
The HYSTEVA TOR booklet explains its many fine services.

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Floodlight and Searchlight Units up to 14 million candlepower.  
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**LISTER-BLACKSTONE, Inc.**  
1704 So. 63th Street MILWAUKEE, WIS.





The new Baker Model 511 bulldozer and, at left, the Model 515, showing in detail the power control unit.

### Power Control Unit And New Bulldozers

A new line of cable-controlled bulldozers, Gradebuilders, and power control units made exclusively for Allis-Chalmers HD-14, HD-10, and HD-10W tractors has been announced by Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill. For over twenty years, Baker engineers have been designing and building hydraulic bulldozers which are readily recognizable by the overhead tie bar.

Features of the new cable-controlled bulldozer include a sturdy reinforced tubular arch mounted at the front of the tractor, a box-welded moldboard, five-position side arms which permit tilting the blade up to 10 inches on the bulldozer and 12 inches on the Gradebuilder from a perpendicular position, a 42-inch blade lift above ground on the bulldozer, a 50-inch lift on the Gradebuilder, and finally a blade drop below ground level limited only by the length of cable.

The power control units feature differential or self-energizing brakes by which the dead end load assists the spring in setting the brake and is arranged so that the differential factor increases as the band lining wears. Less pressure is required on the hand lever in releasing the brake, "air-conditioned" cone-type clutches and hand brakes are employed, and the brakes have 3-inch bands. All adjustments of these units are made at the rear. The drum barrel has a curved contour at the anchor end of the drum to assist the rope to lay closely at the start of winding. These power control units are made in heavy-duty double-drum and single-drum types for rear mounting on Allis-Chalmers HD-14 and HD-10 tractors, double and single-drum medium-duty units for HD-7 tractors, and a single-drum front-mounting type for HD-14 and HD-10 tractors.

A bulletin is now on the press giving complete specifications and pictures of the complete cable-controlled line. Readers of *CONTRACTORS AND ENGINEERS MONTHLY* may send their names to Baker for early mailing of this bulletin, giving their complete address and mentioning this illustrated item.

### Victor Welding Catalog

The 1945 edition of the Victor Equipment Co.'s welding catalog contains 104 pages of illustrations and descriptions covering a comprehensive line of gas welding and cutting apparatus. Several



Complete line of gasoline, pneumatic and electric driven concrete vibrators and grinders. Write for information and prices.

**ROETH VIBRATOR COMPANY**  
1737 Farragut Ave. Chicago, Ill.

up, distribution of this Form 23 is necessarily limited. Those wishing copies, therefore, should write as soon as possible on their official stationery to the Victor Equipment Co., 844 Folsom St., San Francisco 7, Calif., and mention this publication.

### Economy in Patching With Soil and Cement

The use of mixtures of soil and portland cement for patching failures in pavements, especially flexible pavements, has proved to be a successful method in North Carolina, according to a report of L. D. Hicks, Senior Materials and Testing Engineer, North Carolina State Highway and Public Works Commission, in a paper prepared for the Twenty-Fourth Annual Proceedings of the Highway Research Board. Failures in flexible-type pavements are, in most cases, due to inadequate subgrade support and occur in more or less small isolated areas. Satisfactory repair requires

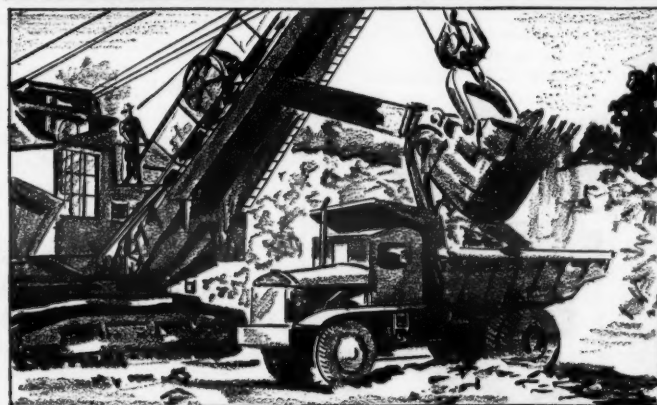
that the unstable subgrade soil be removed to some depth and replaced with more stable material, which generally is granular soil. When properly done, this method is quite satisfactory, but there are many instances where improper workmanship, inadequate design, or the use of unsuitable materials results in a recurrence of the failure.

The labor cost of repairing failures due to unstable subgrade is high, as the excavation is done by hand. Any method which reduces the amount of excavation necessary will reduce the total cost per square yard of the patches. The slab strength possessed by soil-cement mixtures when compacted and allowed to harden serves to reduce considerably the unit pressure applied to the subgrade by surface loads. This allows the removal of much less subgrade material and consequently reduces the cost where much depth of excavation is necessary. This fact, together with the dependability of the method, has been the reason for considerable use of soil-cement for patching in North Carolina.

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A MODERN BATTLESHIP TAKES AS MUCH OIL AT A SINGLE FUELING AS WOULD BE REQUIRED TO HEAT AN AVERAGE HOME FOR 350 YEARS. SINCLAIR IS ONE OF THE LARGEST SUPPLIERS OF FUEL OIL AND LUBRICANTS TO U. S. FIGHTING SHIPS, AND TO AMERICAN INDUSTRIES.

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# The Repair of Roads Used for Maneuvers

## State Forces Rehabilitate 235 Miles of State Roads in Western Louisiana With State and Army Equipment

SINCE 1941 the roads in the west-central section of Louisiana have been used and abused in the almost constantly occurring Army maneuvers so that state forces never had the opportunity to work on the roads and keep them maintained. This condition resulted in a complete breakdown of transportation, with many state roads well nigh impassable in this area. By 1944, Army authorities, realizing the seriousness of the situation, made available a great fleet of road-building equipment to the Louisiana Department of Highways, urging all possible speed in getting the roads back into shape. State maintenance forces, at last given a chance to repair their roads, also threw all available state equipment into the task, first for regrading the roadbeds, repairing drainage structures, and finally resurfacing the roads with gravel, or a mixture of gravel and iron ore. A total of 235 miles of roads was reconditioned in 1943 and 1944 with hired labor which at times reached a peak of 200 men.

### Army Maneuver Area

The Army maneuver area occupies about an 80-mile square in Louisiana, extending from the vicinity of Alexandria westward to the Texas border, and from Natchitoches southward to a point below De Ridder, within the parishes of Rapides, Natchitoches, Sabine, Vernon, and Beauregard.

Rolling topography, equable climate, absence of large population centers, and alternate areas of clearing and woodland, of which great tracts are part of a Government-owned national forest, make this an ideal region for battle maneuver practice of the Army ground forces. It is centrally located to the many southern training camps, while the rough country along the Sabine River at the Texas border is ideal for river-crossing problems, and the state and parish highway systems have offered an excellent network of roads for the Army mobile units.

Even before the war, in the summer of 1941, this area was the scene of extensive maneuvers with National Guard regiments, and in following years the Third and Fourth regular armies deployed as many as a quarter to a half million men in simulated battles. The troops were accompanied by heavy tanks, guns, half-tracks, and other weighty rolling equipment used in mechanized warfare. Roads and bridges designed for lighter peacetime traffic took a terrific beating from the ponderous vehicles of the war machine. Even the concrete pavements, which might seem to have successfully weathered the attack, are reported by highway engineers to be damaged and in need of repairs. The effects of overloading these slabs may not be felt for several years, but

future failures are bound to result from the heavy pounding to which these roads were subjected. Heavy tanks rumbling over concrete pavements chipped off the surface of the road and threw back the particles of concrete like a spray. Heavy impacts broke off slab corners, and smooth-riding surfaces suddenly developed sharp bumps caused by the shifting of an overloaded subgrade or the failure of a drainage structure. An 80-ton Army trailer truck rolled over a timber bridge just west of the old logging town of Louisiana Camp, on La. 21, cracking several of the 6 x 14-inch Douglas fir stringers which under normal conditions would certainly have lasted for many years.

While the hard-surface roads were damaged, the gravel or other all-weather roads were ruined. These roads under heavy traffic lost their gravel surfacing, which was pushed off into the ditches; deep ruts soon developed and became worse as time went by. The methods of maintenance used by the Army only aggravated the condition. Tractors with



Ruts, mud, and loss of surfacing characterized many miles of highways in the Army maneuver area in Louisiana.

dozers were sent down the middle of the road to smooth out the ruts. This operation removed any gravel left on top of the road and clogged up the

(Continued on next page)

# 14 Reasons why PLYFORM is the Universally Standard Re-use Concrete Form Material

Write for a booklet on concrete forms of Douglas fir plywood, giving complete technical data. For help in solving specific problems, write Douglas Fir Plywood Association engineers.



Every panel of PLYFORM carries a distinctive green edge-sealing and the "grade trade-mark" shown below. Douglas fir plywood is available today on priority. Application for allocation must be made by the supplier to the War Production Board.



- 1 Water Resistant Glues
- 2 Grade and Trade Marked
- 3 Strong, Rigid — Yet Light
- 4 Numerous Re-uses
- 5 Large Size Panels
- 6 Easy to Handle
- 7 Water and Mortar Tight
- 8 Smooth Surfaces
- 9 No Warp or Buckles
- 10 Sheathing and Lining
- 11 Use Hand or Power Tools
- 12 Superior Nail Holding
- 13 Adaptable for All Jobs
- 14 Puncture Proof

• PLYFORM is manufactured of selected stock, bonded with highly water-resistant glues especially for concrete form work.

• PLYFORM is grade trade-marked by the Douglas Fir Plywood Association. Every panel meets the strict requirements of U.S.—CS45-45.

• PLYFORM is of cross-laminated construction. It has amazing strength and rigidity, yet is so light that one man can handle the 4'x8' panels.

• PLYFORM can be used again and again with proper handling. As many as 15 re-uses have been reported—a definite advantage on almost every job.

• PLYFORM comes in standard 4'x8' panels (larger on special order). Joints and fins are minimized, rubbing costs reduced from 5c to 12c a foot.

• PLYFORM is easy to handle and easy to build into panel sections. Lightness plus size speeds the work of making forms.

• PLYFORM is both water and mortar-tight, reducing the danger of leakage and resulting in a better job.

• PLYFORM is sanded satiny smooth, and this smoothness is transferred to the finished concrete.

• PLYFORM does not wrinkle when wet, is free of warps or buckles. It builds a better form every time.

• PLYFORM is sheathing and lining combined in one strong, rigid, light-weight material.

• PLYFORM is easily worked either by hand or with power tools. It can be bent to build curved forms.

• PLYFORM can be nailed without boring holes and possesses superior nail-holding strength.

• PLYFORM is suitable for large or small jobs, for structural or architectural purposes.

• PLYFORM is puncture-proof and split-proof. It can stand hard usage without disintegrating.

**Shunk**  
Superior Quality  
**BLADES**  
AND CUTTING EDGES

For any make of machine  
Motor Graders, Main-  
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Builders, Trail Blowers,  
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CUTTING EDGES  
WEARING BOOTS  
BACK SLOPERS  
EXTENSION BLADES  
MOLDBOARDS  
and  
SCARIFIER TEETH

30 years of manufactur-  
ing blades has developed  
for you a special steel,  
milled through our own  
rolls and forged at the  
edges to give that extra  
wearing quality you need.

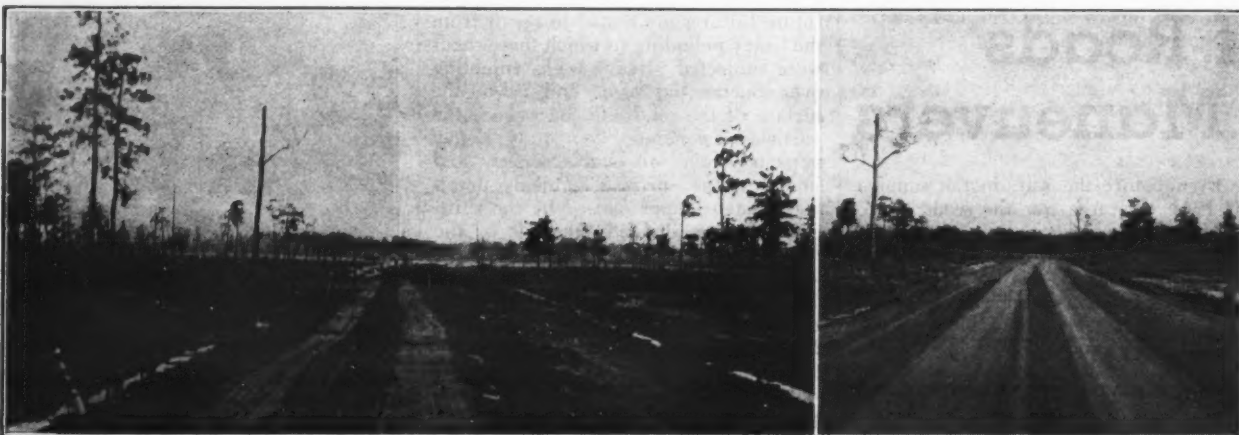
All widths lengths, and  
thicknesses. **SHUNK'S**  
ready to fit your machine.

Consult your international-  
ly recognized Blade Spec-  
ialists. Write for special  
bulletins, giving type and  
name of machines you  
operate—get set for blades  
easy.

**Shunk**  
MANUFACTURING  
COMPANY  
BUYRUS, OHIO

DOUGLAS FIR PLYWOOD ASSOCIATION, Tacoma 2, Washington





At left, a section of La. 322 which became impassable during Army maneuvers because of deep ruts. Contrast the plank runway built by the Army to carry one-way traffic with the road as repaired by state highway forces.

## The Repair of Roads Used for Maneuvers

(Continued from preceding page)

drainage ditches on the sides so that the road itself became one big drainage ditch. Motor convoys parked on the shoulders or ran up and down the slopes, tearing off the sod and topsoil and permitting much erosion.

### Roads Impassable

At the beginning of 1944 the roads had become so impassable that a 500-vehicle convoy, attempting to travel the 12 miles between Simpson and Kurthwood on La. 504 just south of the Kisatchie Division of the Kisatchie National Forest, became bogged down in what had once been a first-class gravel road. Schools were closed from six to eight weeks because neither teachers nor pupils could reach them. Food supplies or mail could not be brought to the farmers or lumber camps in that area. An Army hospital unit got marooned north of Leesville and the patients had to be carried to town on stretchers. When residents of that area died, their bodies had to be taken out on half-tracks for burial. The whole countryside was stuck in the mud.

The Army finally became aware of the gravity of the situation and made available to the State a \$1,629,216 appropriation for repairs to the damaged roads. This sum included costs for engineering, labor, and material, such as gravel, iron ore, culvert pipe, bridge material, etc., that had to be replaced. No road could be improved or bettered, only repaired and brought back to its original condition. There was no time to draw plans or award contracts. The state maintenance forces moved to the area all equipment, such as tractors, graders, blades, draglines, scrapers, etc., that could be spared from other districts. Laborers and equipment operators were recruited in large numbers, the latter being particularly difficult to obtain, and in many cases had to be trans-

ported as far as 40 miles from their homes to the job site every day. Contractors' superintendents from recently completed projects at training camps nearby were obtained to direct the work.

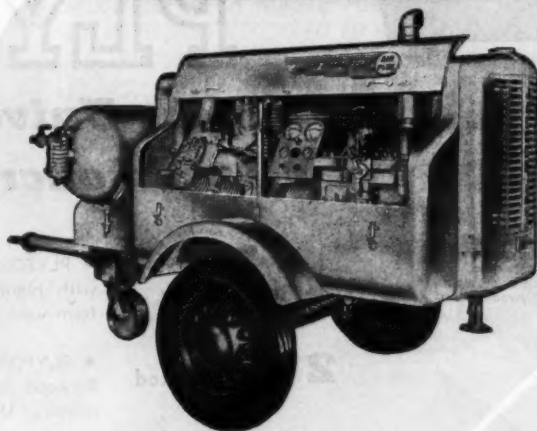
### Army Equipment Loaned

The repair work started early in February, 1944, and Army officials issued a directive to have the roads repaired in thirty days. A year later, February,

1945, this work was 90 per cent completed. These repair crews, using state equipment, worked through February and March, and during that time managed to get the major roads open again. Graders and tractor-dozers cleaned the ditches and pulled the cast-off gravel back on the road surface which had to be regraded as if no road had ever existed there before. In some cases, fills as high as 3 feet had to be built up again. Great holes were filled in and by April, 1944, the roads were in passable condition so that the Army could use them and surfacing operations could begin.

In April the Army furnished additional equipment to speed the work. This included 100 trucks, from 2 to 5-ton capacity, 70 of which were Internationals and the remainder of various makes, which came from Army camps in Louisiana, Texas, Mississippi, and Arkansas. Other heavy equipment from the U. S. Engineers at Austin, Texas, included 4 draglines, 2 Lorains, a Marion, and a

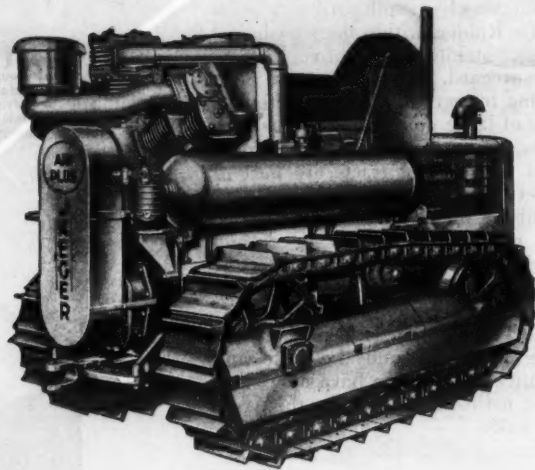
(Continued on page 84)



High Speed 2-Wheel Trailers  
60 and 105 Ft.

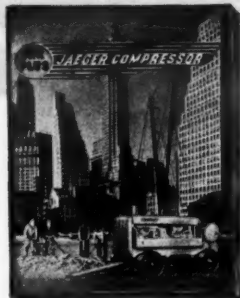


"TRAVEL-AIR" Tractor-Mounted  
and Powered Compressors  
160 to 315 Ft.



4-Wheel "Auto-Steer" Trailers  
210 to 500 Ft.  
Gasoline and Diesel Powered

Truck-Mounted Models 60 to 500 Ft.



**WON'T QUIT  
or cause time out**



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward  
Company  
32-36 Dey Street  
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**Hayward Buckets**

Engineered for war, where rugged toughness and low fuel consumption are military "musts", these precision-built Compressors are ready to travel and deliver air for today's toughest construction jobs, at lowest known cost in fuel and upkeep. Send for complete catalog describing the most advanced line of air compressors in America. THE JAEGER MACHINE CO., 701 Dublin Ave., Columbus 16, Ohio.



"FLEET-FOOT"  
Loaders



"SPEEDLINE"  
Concrete Mixers



"SURE PRIME"  
Contractor Pumps

**JAEGER**

*Engineered* **EQUIPMENT**

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS





The new Wood portable supply tank.

### A New Booster Tank For Bituminous Work

A new type of supply tank which can be used with any traveling mixing plant and for off-the-highway work has been announced by the Wood Mfg. Co., 816 W. 5th St., Los Angeles 13, Calif., manufacturer of the Wood Roadmixer and other road-building equipment. It is built for carrying road oils, emulsions and cut-backs, and can be used for the transfer or temporary storage of practically any fluid, including water for concrete pavers. The 3,000-gallon tank is divided into 1,000 and 2,000-gallon compartments. A 3-inch Roper pump, powered by either a Chrysler or Ford industrial engine, is mounted at the rear for loading or delivering the liquids.

Features of this unit include tandem rear wheels mounted on a walking beam and front wheels mounted on a center pin. This, plus springless suspension, eliminates twisting and torsional stresses, keeps the load on an even keel, and gives an even distribution of the weight. Accessory equipment available at extra cost includes a spray bar, insulation, and a heating unit, as well as a wheel-braking system. The addition of the spray bar permits watering of sandy air-fields and other areas where a supply tank can be towed behind a tractor.

The outfit is 9 feet 6 inches high, 8 feet 5 inches wide, and 27 feet 6 inches long, including the tongue. A special bulletin, including prices, on this supply tank may be secured by writing direct to the manufacturer.

### Timber Fabrication To Be a Specialty

A new West Coast organization has acquired the only plant in Tacoma, Wash., that is equipped to handle large-scale prefabrication of structures. The Tacoma Lumber Fabricating Co. is the name chosen by a group of Tacoma wood-products industry men for the new company, which has purchased the Henry Mill & Timber Co. plant in Tacoma. This mill, which was one of the city's principal saw mills, was burned in June, 1942, and was immediately converted to a prefabricating, remilling and framing plant and equipped to handle anything up to heavy timbers.

modious office building, and a large gluing shed under construction.

Charles B. Hurley, Jr., for many years with the Pacific National Lumber Co., will be Plant Manager, and J. B. Coons, long with the Henry Mill & Timber Co., will be Plant Superintendent. No definite limitation has been put on what items will be fabricated by this new company, but the plant is completely equipped to fabricate arch timbers and truss members for hangars, garages, shops, bridges, and other jobs of that nature.

### W. B. Pringle Heads Caterpillar N. Y. Office

The Caterpillar Tractor Co., Peoria, Ill., has announced the appointment of W. B. Pringle as Manager of the New York Office, succeeding the late George E. Churchill. Mr. Pringle has represented the company in the Scandinavian countries, North Africa, the Balkans, and central Europe. He was a member of the Caterpillar sales training staff in



"I want to commend the fine spirit of responsibility you men have shown in first digging a foxhole for your tank."

Peoria from 1938 to 1941, and later served as Assistant to the President of the Caterpillar Military Engine Co., a subsidiary, at Decatur, Ill. Prior to his present appointment, he was Manager of the Berwick, Pa., office, where he will be succeeded by Don E. Kneer.



## "Bring on your TOUGH JOBS

Our equipment is wear-proofed with **STOODY SELF-HARDENING now!**

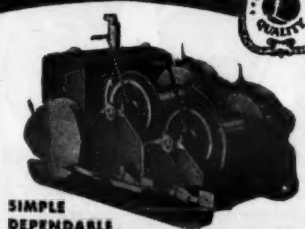
**W**HEREVER you go—whatever the job, you've got to figure on equipment maintenance costs. Parts will wear out, equipment must go down for repairs. But there is a way you can lower both operating costs and downtime. Here's how: Next time your power shovels are down for repairs, try Stoddy Self-Hardening on the bucket sides, bottoms, lips, runners and teeth; also on track pads, rollers, tumblers, idlers and other wearing surfaces. In the past these parts were often built up with high carbon or manganese rods. But here's the catch: Although these electrodes cost a few cents less than Stoddy Self-Hardening, all three require approximately equal application time, and equal shovel downtime—yet there's no comparison in wear resistance between Stoddy Self-Hardening and the others!

Differences in total cost between reclaiming shovels with any of the above three electrodes is negligible. However, Stoddy Self-Hardening will conservatively give double the wear of manganese deposits... several times the wear of high carbon. Stoddy Self-Hardening likewise bonds well with manganese parts, is easy to apply and won't chip under impact. If you're looking for longer power shovel life with no extra trouble, order 100 lbs. of Stoddy

Self-Hardening today and give it a trial. Costs 50 cents per lb., f.o.b. 600 U. S. distributors or Whittier, California.

If you want to study typical photos and information on applying Stoddy Self-Hardening to all types of heavy equipment, write for our free booklet, "Specification Sheets." There is no obligation. STODDY COMPANY, 1136 West Slauson Ave., Whittier, California.

### STERLING HOISTS



SIMPLE  
DEPENDABLE  
RUGGED - WRITE FOR LITERATURE

STERLING MACHINERY CORPORATION  
105 Southwest Blvd., Kansas City

For building up worn areas before hard-facing with Stoddy Self-Hardening, specify the new Stoddy Manganese. You'll get greater speed of deposit, easier slag removal, low penetration with high build-up.

## STOODY HARD-FACING ALLOYS

Retard Wear

Save Repair



## Cost of Maintenance Of Roads in Winter

The Twelfth Biennial Report of the Vermont Department of Highways has some very interesting figures on winter-maintenance costs in the Green Mountain State. Winter maintenance in Vermont includes the erection of snow fence, snow removal, sanding, and miscellaneous work such as removal of ice accumulations, etc.

On the state highway system the cost per mile for winter maintenance has increased from \$72 in 1931-32 to \$306 in 1943-44, which is a continuous increase except for a \$40-per-mile reduction in 1942-43. In discussing this steady increase in costs, Hubert E. Sargent, Commissioner of Highways and Chief Engineer, writes, "The increase in cost per mile has been due to three things: the increased cost of materials and of the increased demands of the traveling public for better winter maintenance and labor. The labor cost has been influenced considerably by the necessity of

### COMPARISON OF WINTER-MAINTENANCE EXPENDITURES STATE HIGHWAY SYSTEM

Fiscal Year	Miles	Total Expenditures	Cost Per Mile
1931-1932	1,006	\$ 72,200.08	\$ 72.00
1932-1933	1,006	77,127.76	77.00
1933-1934	1,022	139,182.77	136.00
1934-1935	1,022	155,779.09	152.00
1935-1936	1,748	318,421.49	182.00
1936-1937	1,748	327,585.17	187.00
1937-1938	1,751	344,452.03	197.00
1938-1939	1,751	444,917.01	254.00
1939-1940	1,751	475,458.26	272.00
1940-1941	1,751	511,786.74	292.00
1941-1942	1,776	518,597.79	292.00
1942-1943	1,780	448,718.70	252.00
1943-1944	1,781	544,289.16	306.00

### STATE-AID HIGHWAY SYSTEM

Year	Miles	Cost To State	Cost Per Mile To State
1932-1933	2,664	\$ 38,987.95	\$ 15.00
1933-1934	2,716	67,130.06	25.00
1934-1935	2,904	59,686.05	21.00
1935-1936	2,400	66,843.45	28.00
1936-1937	2,400	47,636.91	20.00
1937-1938	2,400	57,443.38	24.00
1938-1939	2,400	77,624.36	32.00
1939-1940	2,400	97,189.98	41.00
1940-1941	2,400	86,491.16	36.00
1941-1942	2,400	80,756.37	34.00
1942-1943	2,400	86,654.55	36.00
1943-1944	2,400	98,786.70	41.00

finding work for men during slack periods in order to hold them. The amount of total snowfall for the year has varied very little in the last few years.

"The exception in 1942-43 is due to our attempt to reduce winter-maintenance expenditures, along with the other reduced maintenance expenditures, in order to conform to decreased motor-vehicle revenue due to the war. We started the winter by sanding only the hills and curves, instead of all the roads, when it was slippery. The protest, especially from the tank truckers, was so strong that this policy had to be abandoned, and we went back to our old custom of sanding all the roads when in a slippery condition."

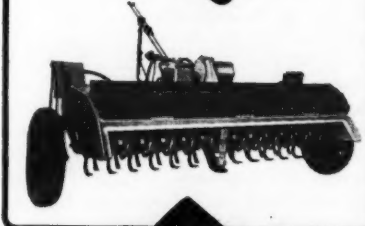
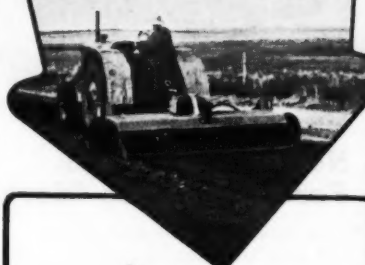
On the State-Aid highway system, Vermont pays one-half the cost of winter maintenance to the towns, the latter doing all the work. However, the State's share cannot exceed \$50 per mile of State-Aid highways in a town.

### New Sales Promotion Dept.

A sales promotion department to serve the Replacement Tire Sales Division of The B. F. Goodrich Co., Akron, Ohio, in the preparation of retail advertising and sales-promotion material has been

established, with A. R. Bowlzer as Manager. Mr. Bowlzer has been with Goodrich since 1932 in the service department of its Los Angeles factory. He went to company headquarters in Akron in 1937; since 1943 has been Assistant Manager of automobile-tire sales.

## GET READY TO BUILD SECONDARY ROADS!



HERE'S THE EQUIPMENT DESIGNED ESPECIALLY FOR THE JOB!

## ARIENS AGGMIXER

FOR use wherever aggregates are used, such as all types of bitumens, clays, cements, chlorides, etc.—for mixed-in-place construction work—Ariens Aggmixer thoroughly pulverizes, mixes and aerates almost all types of aggregates with the binder used. The materials are mixed without being displaced on the road surface, the result in texture and appearance being similar to materials from a travel or stationary plant mixer. Does a thorough job, rapidly and economically, operating with other general purpose road equipment. Easy and safe to operate, adjustable to any tractor with hydraulic adjustment for depth that is simple and positive. Made in 4 sizes with normal cutting widths 4', 5', 6', and 7'.

Write for job fact sheets and nearest distributor.



## ARIENS COMPANY

BRILLION, WISCONSIN



Pledge Your Support  
BUY WAR SAVINGS  
BONDS AND STAMPS

## Do You Remember — That Agile Central Mixing Plant?

UTAH INDIANA ARKANSAS

**The Mystery of the REAPPEARING CENTRAL MIXING PLANT**

Be on the lookout for a Butler central mixing plant; height about 75 feet; wearing a coat of gray paint; last reported in the State of Washington; has also been seen in Texas, Utah, and Indiana. Has a long record of production—nearly 600,000 cubic yards of concrete poured, and more to come. 150 yards per hour for days on end.

Though it sounds something like a mystery novel, there is really nothing mysterious about the remarkable performance of this plant—it is a Butler Engineered Design. Butler engineers have been designing

plants for more than twenty years, plants whose efficiency, dependability, and versatility are built in. No wonder, then, that they are so good on their tenth job as on their first.

If you have a concrete job, large or small, be sure to call upon the Butler engineer. His suggestions are available to you regarding central mixing plants, ready mixed concrete plants, bulk cement plants, batch bins, and crushing plants. The first step toward the most successful job is Butler Engineered Design.

# Presto!

## IT'S REAPPEARED AGAIN!

During 1944 a Butler advertisement appeared which said, "Be on the lookout for a Butler central mixing plant; height about 75 feet; wearing a coat of gray paint; last reported in the State of Washington; has also been seen in Texas, Utah and Indiana. Has a long record of production—nearly 600,000 cubic yards of concrete poured and more to come. 150 yards per hour for days on end."

That Butler central mixing plant with an itch for sight-seeing has now appeared in Arkansas. The

prophecy of "more to come" was no exaggeration for the total production of that rugged Arkansas Traveler is today well over a million yards—and—we repeat—"more to come".

A million yards! That's equivalent to a concrete highway 8 inches thick, 20 feet wide and 384 miles long! Whether it's central mixing plants, ready mixed concrete plants, bulk cement plants or batch bins Butler Engineered Design generally means service far beyond reasonable expectations.



## BUTLER BIN COMPANY

WAUKESHA, WISCONSIN



# Reclamation Construction Hits High in Past 25 Years

**Started in 1902, Program Includes Small As Well As Giant Projects Like Boulder And Shasta; a Look Ahead**

♦ DURING the past twenty-five years, one of the most important achievements in this boldest construction era in American history has been that of the Bureau of Reclamation in developing the limited water resources of the Far West.

Boulder, Grand Coulee, Shasta, Friant, and Marshall Ford Dams, all built by the Bureau of Reclamation since 1902, are the five largest concrete dams constructed since man deliberately began to obstruct streams to serve his needs. Because of their spectacular size and because man dared to build them, Columbia Basin and Central Valley Projects have become household words to all America; to engineers throughout the world they are masterpieces of design, construction, and durability.

The attention given the "super-dams" built by the Bureau of Reclamation has overshadowed much important work done on a smaller scale. The Colorado Big Thompson Project, Anderson Ranch Dam in Idaho, the Scofield project in Utah, and the Altus project in Oklahoma are but a few of hundreds of extremely important local projects which have been carried to completion or initiated during the past twenty-five years. Thousands of canal structures, bridges, culverts, and other facilities have been built to extend the service of water and electric power to farms and communities throughout the entire West.

## Work in 1920

In 1920, the Bureau of Reclamation had a great deal of construction work in progress but no outstanding engineering structures were being built at that time. Construction was in progress on the Salmon Lake Dam near Conconully, Wash., as a feature of the Okanogan project. Salmon Lake Dam was constructed as an earth-fill structure 40 feet high, with a crest length of 1,260 feet, and contained 194,000 cubic yards of earth. Canal lining extensions to lateral distribution systems, repair of storm damage on Granite Reef Dam in Arizona and on Minatare Dam on the North Platte Project, and general repair and maintenance work were in progress. An indication of the volume of this type of work by the Bureau of Reclamation is contained in the \$20,000,000 request for funds made to Congress for the fiscal year 1920-21.

Despite the small volume of construction work, extensive investigations were under way on possible multi-purpose projects located throughout the entire eleven western states. A notable one was the preparation made, under joint financial arrangements with the State of Arizona, for the Bureau to "... make surveys and investigations to ascertain

the feasibility of the construction of a dam in the canyon of the Colorado River below the confluence of the Virgin River and the Colorado River in Arizona, and the storage and power facilities that would be produced thereby. . . . Since the first days of Federal reclamation, the Colorado River had been a siren calling reclamation engineers to return again and again, fascinated by the promise of the colossal irrigation and power possibilities it held. These early visits to the canyon of the Colorado narrowed the choice of sites for the first dam to the Boulder and Black Canyons, and preliminary exploratory drilling late in



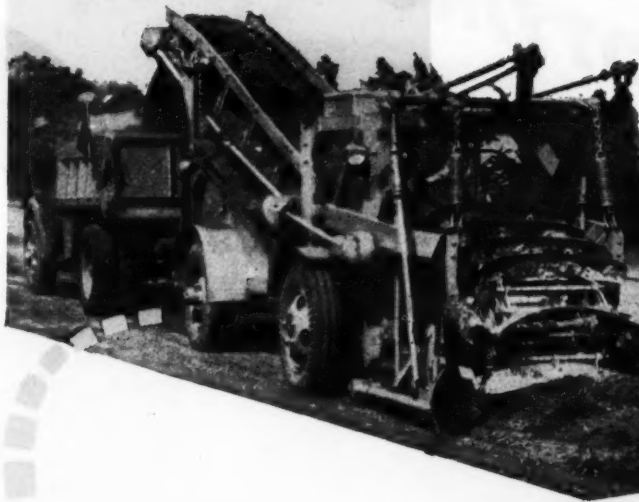
One of the outstanding construction jobs of the past quarter century, Boulder Dam was the first of the Bureau of Reclamation's great projects in the West.

1920 indicated good foundation conditions for both sites.

In the meantime, the Engineering Office of the Bureau at Denver prepared

several preliminary designs and cost estimates for dams and reservoirs, the largest of which was for a reservoir of (Concluded on next page)

Athey Force-Feed Loader removing sod and earth left in windrows by Motor Grader on maintenance operations on a State Highway.



## ROAD REPAIR CREW... 1945 STYLE!

THOUSANDS of miles of war-worn highways are scheduled to get high-priority attention during 1945. Highway maintenance, repairs and rebuilding are being given the "go ahead" as war-urgent projects. To help in relieving manpower shortages, and to speed highway maintenance jobs, Athey Force-Feed Loaders are in great demand by highway departments and engineers throughout the country. These loaders, working as companion tools with the "Caterpillar" Motor Grader, pick up and load windrowed material from road surfaces faster and cleaner than previous methods. They are a fast-working companion tool with the Motor Grader for road widening, ditch cleaning, slope trimming, loading oil mix material, salvaging road surface material and other highway maintenance operations. Athey Force-Feed Loaders load sod, earth, rock, sand, oil mix, trash and other materials better, quicker and cheaper. Get full facts now on this revolutionary loading machine. Ask your Athey-"Caterpillar" Dealer for further information, or write to Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

## DEPENDABLE LOADING AND HAULING EQUIPMENT



FORCE-FEED LOADER



FORGED-TRAK TRAILERS



MOBILE LOADERS

It's easier to lift, lower, push or pull the Simplex Way!

**Simplex  
Jacks**

for every construction purpose  
Awarded the Gold Medal for Safety  
Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.



## Reclamation Work In Past and Future

(Continued from preceding page)

31,400,000 acre-feet. The capacity of Lake Mead is 32,360,000 acre-feet. As a result of the investigations, a Board of Consulting Engineers in May, 1921, declared damming the Colorado practicable and financially feasible. The Colorado River investigations were in charge of Walker R. Young, recently appointed by the Secretary of the Interior as Chief Engineer of the Bureau of Reclamation. The subsequent construction history of Boulder Dam is too well known to justify repeating it. In the history of construction it will remain forever one of the outstanding construction achievements of the quarter century bounded by the years 1920 and 1945.

### Résumé of Past 25 Years

Outstanding construction achievements became the rule for the Bureau of Reclamation during the past twenty-five years. Before work was completed on Boulder, the world's highest, construction was in progress on Grand Coulee, the world's largest concrete dam. Built during the same period were Shasta and Friant Dams, the construction genesis of a vast plan to develop and utilize the water resources of the great Central Valley of California; Marshall Ford Dam in Texas; Anderson Ranch Dam in Idaho; and the Colorado Big Thompson Project involving trans-mountain diversion under the Continental Divide. All but Anderson Ranch have been completed in their initial stages. The spectacular features of these projects brought them to public notice. In every one of the eleven western states, small projects and extensions to older projects have been initiated and completed or carried to various stages of completion.

The volume of construction work carried on by the Bureau of Reclamation during the past twenty-five years is shown in the accompanying table which also reflects the contrast between that period and the one covering the first eighteen years of Federal reclamation activity.

### Program for Future

The past accomplishments of the Bureau of Reclamation are but a fore-runner of the job required to harness the remaining undeveloped water resources of the West. In response to requests from the Congress and from the President of the United States, the Bureau prepared an inventory of multiple-purpose projects for construction after the close of the war.

The inventory presents a list of 415 potential projects at an estimated construction cost of \$4,792,400,000, based on 1940 prices. The program, if activated by the Congress, is designed for a "quick get-away" in the post-war period, and at the peak of employment will provide jobs for more than a million workers, about 400,000 at construction sites and an additional 640,000 on off-site jobs in manufacturing, transportation, and other lines. Construction of these projects would be geared to national employment needs, and may extend over

### Construction Summary—Bureau of Reclamation

Feature	1902-1920	1920-1945	Total
No. of projects	28	50	78
Dams (number)	76	91	167
Reservoir storage capacity (acre-feet)	9,441,910	59,558,090	69,000,000
Canals (miles)	11,049	9,775	20,824
Canal structures	102,213	107,974	210,187
Ditches and drains (miles)	1,616	3,490	5,106
Tunnels (number)	95	286	381
Tunnel mileage	27	81	108
Bridges	7,293	7,064	14,357
Culverts	9,460	14,001	23,461
Flumes	3,307	3,191	6,498
Roads (miles)	986	3,222	4,208
Excavation, all classes (cubic yards)	178,652,141	432,908,205	611,560,346
Transmission lines	650	5,172	5,822
Elec. gen. capacity <sup>1</sup> (kw)	29,212	2,340,788	2,360,000
Elec. energy output <sup>1</sup> (kwh)	134,800,000	13,865,200,000	14,000,000,000

<sup>1</sup>Figures in these lines represent the fiscal years 1920-21, 1913-14, and the contrast between those years.

a period of from 15 to 25 years.

The prospects for labor in this program are indicated in estimates made by the Bureau of Labor Statistics which studied the inventory and concluded that it would require, for completion, 1,650,000,000 man-hours of construction labor and 2,600,000,000 man-hours of labor in manufacturing, transportation, etc., in connection with the materials required for construction.

Since the creation of the Bureau of Reclamation in 1902, the fundamental

purpose of its plans, programs, and actual construction work has been to provide homes for people and to develop the West through the conservation and multiple use of its meagre water resources. The Bureau's post-war program has been planned with this fundamental purpose in view, and, when completed, will result in the creation of opportunities for the establishment of more than 193,000 additional resident-owned and operated farms, and the annual generation of billions of kilowatt-hours of

electric energy, not only to reduce the drudgery on those farms and to make them more profitable enterprises, but also to supply western municipalities and new and expanding industrial ventures with low-cost power. Among the important corollary results of this attack on the remaining undeveloped waters of the West will be navigation improvement, recreational opportunities, salinity control, and the preservation of fish and wild life.

The Bureau of Reclamation program for the future, therefore, is not a stop-gap or make-work proposal, but is a regenerative one—one to start a continuing chain of wealth-producing activities to add to the prosperity and general welfare not only of the West but also of the nation.

Records kept by rural mail carriers on car operating costs on various types of roads show a cost per mile of 7.8 cents for earth roads, 4.5 cents for gravel roads, and 3.8 cents for paved roads.

# SPOTTING THE MARK



**That Means LOWEST POSSIBLE COST**  
PER YARD . . . PER TON . . . PER ACRE !

When the time comes to buy new equipment for tomorrow's earthmoving and land clearing jobs, it will pay you to remember the mark LPC, as your guide to lowest possible cost. For LPC stands for LaPlant-Choate—the job-proved line of tractor equipment that's known and respected the world over for its outstanding performance on thousands of tough jobs. Designed and built by "specialists" with over 34 years of practical "know-how," LaPlant-Choate equipment will continue to be a step ahead in improvements that assure lowest possible cost per dollar invested. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.



**ALL TYPES OF DOZERS\***—Straight or angling blade, hydraulic or cable operated, for every size of track-type tractor.



**LARGE OR SMALL SCRAPERS**—Hydraulic or cable operated, front or rear dump, for use with wheel or track-type tractors.



**CABLE OPERATED RIPPERS**—For ripping up hard ground, shale or concrete to facilitate loading with "Carrimor" Scrapers.



**LAND CLEARING TOOLS**—A complete line of Brush Cutters, Treaders, Rootcutters and Brush Bales—all interchangeable.

**LAPLANT**

EARTHMOVING AND LAND



**CHOATE**

CLEARING EQUIPMENT

\* Again in '44, LaPlant-Choate delivered more dozers to the armed forces and other essential users than any other company in the industry—almost as many as all the other manufacturers combined

## VULCAN TOOLS

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## Asphalt Kettles Are Back in Production

Announcement has been made by the Aeroil Burner Co., Inc., West New York, N. J., that the 55-gallon-size Aeroil Heat-Master kettle is in production again for the first time since early 1942, with a full choice of three different types of mounting. These mountings are a pneumatic-tired high-speed trailer, steel wheels, or skids. Among the features of the Heat-Master are the instantly removable heating unit, the specially designed draw-off cock, and the burner well with its burner inside the kettle.

Copies of Aeroil Bulletin No. 260F with further details on the Aeroil Heat-Master and complete information on its availability may be secured direct from the manufacturer.

## Termination "Bible" For War Contractors

This is just a reminder to any readers of CONTRACTORS AND ENGINEERS MONTHLY who hold war contracts that the Joint Army-Navy Termination Regulation is the "Bible" to be used in the rapid settlement of war contracts. A recent survey has disclosed that less than

40 per cent of the war contractors circularized availed themselves of this publication. A Joint Army-Navy "Readjustment Distribution Center" has been established at 90 Church St., New York 7, N. Y., to distribute this publication, together with other printed matter pertaining to contract settlement.

There is no charge for any publication distributed by that office. Merely write "Attention, Lieutenant E. P. Lull", and copies will be forthcoming. It is imperative that contractors holding war contracts be placed on the mailing list for the Regulation and all subsequent changes.

## New Ransome Vice President

Announcement has been made of the appointment of Carl F. Oechsle as Vice President in Charge of Sales of the Ransome Machinery Co., of Dunellen, N. J., a subsidiary of Worthington Pump & Machinery Corp. The sale of the Ransome line of concrete pavers and mixers will now be handled through Worthington's Construction Equipment Department, of which Mr. Oechsle is Manager.

Headquarters of this sales department are located in Holyoke, Mass., with regional offices in New York, Washington, Cleveland, Chicago, and San Francisco.

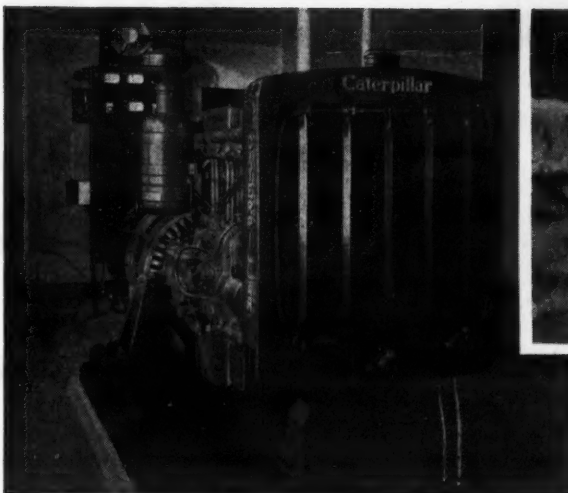
# THE YEARS TELL THE Story of their life

**W**HEN you buy a "Caterpillar" Diesel Engine,\* it won't take you long to discover the size of the load it can handle. Or the amount of machinery it can drive. Or the smoothness with which it runs. Or the little attention—and practically no adjustments—it requires. Or the amazing amount of power it can wring out of a gallon of low-grade, low-cost fuel.

For these things can be measured. Or seen. Or figured in economical dollars and cents.

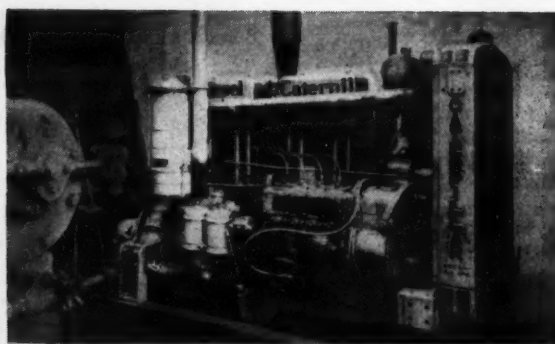
But to estimate its maximum serviceable life would ordinarily be a matter of waiting—for years. Today, however, you can judge pretty closely by the records of plenty of other engines just like it . . . work engines that have "been through the mill" and have many thousands of hours of actual running behind them. Cited here are just a few of such records.

**CATERPILLAR TRACTOR CO.**  
Peoria Illinois



**21,400 HOURS**

This "Caterpillar" Diesel Electric Set was installed nearly seven years ago as an emergency lighting plant at the Syracuse Airport. Required only 12¢ worth of repairs during its first 3½ years of service.



**65,000 HOURS**

A "granddaddy" among "Caterpillar" Diesels, this D7700 drives an ammonia compressor for A. J. Krecker Co., Chicago. Record includes 9000 hours of almost continuous running with little or no maintenance expense.



**34,400 HOURS**

This "Caterpillar" Diesel D4400 powering electric generator was installed in 1940. Operates 24 hours a day furnishing light and power for the town of Haswell, Colo.



**32,000 HOURS**

This running record was made by this "Caterpillar" Diesel D4400 in exactly 5½ years, producing power for incubators, battery brooders, water pumps, lights, etc., for the Bolton Farms Hatchery, Schoenck, Pa. Runs 24 hours a day, seven days a week, and is seldom shut down more than once in two weeks.

## CATERPILLAR DIESEL ENGINES



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\*The horsepower of "Caterpillar" Diesel Engines is ALL WORKPOWER. Ratings show sustained output of a fully equipped engine—not the momentary peak performance of a powerplant stripped of fan, pumps or other necessary accessories.



## Levee Paving

(Continued from page 1)

any of the new concrete slabs.

The Promised Land Levee was built on its present location in 1895-96, enlarged in one section in 1913 and in another section in 1926-27, and shelters some fertile plantation land lying east of the river. The existing levee crown has an average height of 17 feet above mean sea level, while the top of the new paving was set at Elev. 15, 2 feet below the crown. The 1 on 3 river-side slope had been protected by a wooden revetment which had been broken up over the passage of years, and the levee was exposed to wave action from the Mississippi River during high stages.

### Grading and Forms

Before any paving could be laid, that part of the berm which covered the toe of the slope for a depth of about 3½ feet, tapering off to 0 about 10 feet up from the toe, had to be removed. A General dragline with a 45-foot boom and a ¾-yard Hendrix bucket worked along the 40-foot berm, clearing the slope and piling the excavated material on the berm about 10 feet beyond the toe. This dike caused no interference to paving operations, and was a protection from high water during construction.

The slope was then compacted by a sheepfoot roller, equipped with tamping feet 7 inches long, and pulled by a Caterpillar D7 tractor. A total of eight passes over the slope was considered sufficient. This method of compaction where the tractor and roller run lengthwise of the slope is possible only on a levee constructed some time ago. On levees built or enlarged within the past year, the earth would not have dried out or compacted sufficiently for such equipment to obtain the necessary traction to operate in this manner. In such instances, the roller is pulled up and down the slope by a dragline working along the levee crown. The sheepfoot was followed by a Bros wobble-wheel roller to secure final compaction. Final smoothing of the surface to remove any ruts was done by a Caterpillar No. 212 power grader also working along the slope. To prevent any possible overturning of this machine, a steel cable was strung from the grader to the Caterpillar D7 tractor which moved along the crown of the levee at the same speed as the grader, serving as an anchor.

Before any forms were set, the slopes were further trimmed and smoothed by hand with shovels. Forms consisted of wooden 4 x 4's which came in random lengths and were spliced to make side forms 27 feet long, the length of the slab from crown to toe of slope. The forms were set 6 feet apart, the width of the panels, and were held in place by two wooden stakes on each side driven about 6 feet from each end. Pouring was done in alternate panel strips. Forms were also set along the top and bottom of the slope and a trench for a cut-off wall was dug with hand shovels alongside the top form within the sections to be paved. This cut-off wall, whose function is to prevent undermining of the slab by rain or wave wash, is 12 inches deep and 6 inches wide at the bottom

and runs the entire length of the paving.

### Joints

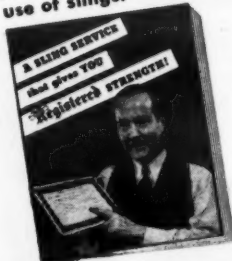
Expansion joints were placed 3 feet down from the top of the slope, 4 feet up from the bottom, and also at the midpoint of the remaining distance, forming two sections of 10 feet each in addition to the top and bottom sections in each panel. The expansion joints were of 30-pound Texaco-asphalt-saturated felt pa-

per which has a thickness of about 1/16 inch. The 4-inch-deep cross joints 6 feet long, which separated the sections of each panel, were held in place by a metal joint holder the same size as the felt paper with a 1½-inch lip on top to secure the material during the concreting operations. These joint holders were fastened in the ground with three pins, 24 inches long, which were welded to the back of the holder on a 5-inch offset.

This offset was necessary because of an 8-inch-wide strip of expansion material which was placed on the ground under each joint so that half of the width, or 4 inches, lay beneath each slab. The joint was thus protected from any dirt or stones working up into it from the bottom. When one panel was poured and the forms removed, a strip of expansion material was placed along the side of

(Continued on next page)

• Full story briefly summarized in Bulletin, "A SLING SERVICE THAT GIVES YOU REGISTERED STRENGTH." Send for it! Opens a new era in the use of slings.



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On the Rud-O-Matic Combination Magnet Reel and Tagline, both drums revolve together. In attaching the electric magnet cable, a little slack is allowed. The tagline cable is attached with sufficient tension to steady the magnet. Both cables then feed back and forth in the same relation as originally set. An inner spring on the reel drum provides the tension. With this equipment there is no chance for the electric cable being pulled apart or jerked loose from connections.

Most Crane Manufacturers have adopted  
Rud-o-Matics as standard equipment



## Levee Paving

(Continued from preceding page)

slab before the alternate panel was paved.

The widths of expansion material used were either 4 or 8 inches, so a 3-foot-wide roll of the felt was cut in these sizes by a Mall power saw. Strips were then torn off these smaller rolls in whatever lengths were desired by the men setting the joints.

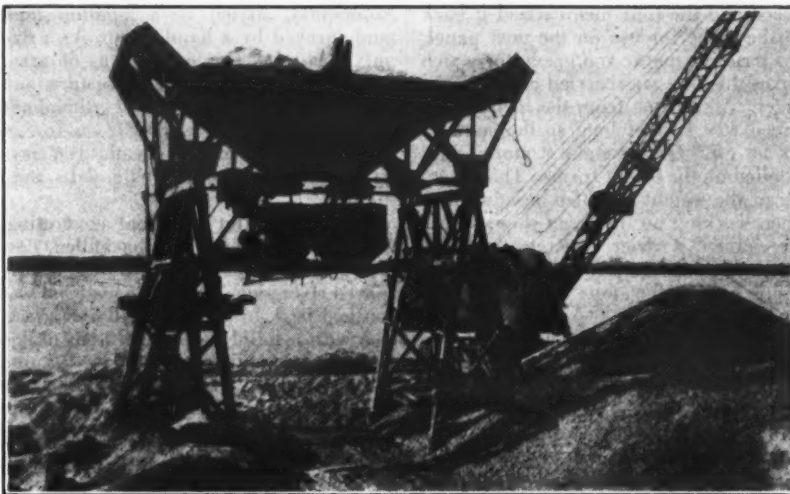
### Batching Plant

Equipment used in this levee paving was practically the same as that used in the construction of any concrete highway. A batching plant was set up on the bank along the river side of the levee about  $\frac{3}{4}$  mile below the north end of the job and consisted of a Johnson bin divided into two compartments, each with a capacity of 55 tons, for the sand and gravel used in the pour. Sand was also stockpiled on the south side of the bin, and gravel on the north side, while both were fed to the bin by a Northwest 25 crane with a 40-foot boom and a  $\frac{3}{4}$ -yard clamshell bucket which worked along the river side of the plant. Sand and gravel were purchased from Jahncke Service Inc. of New Orleans, but the material had to be transported from its plant at Franklinton, in eastern Louisiana, 45 miles on the G M & N Railroad to Slidell, where the aggregate was loaded on barges and shipped 75 miles via Lake Pontchartrain, the New Orleans Industrial Canal, and the Mississippi River to the batching plant. Here it was unloaded by the barge crane.

Bag cement was purchased from the Lone Star Cement Co. in New Orleans, shipped 18 miles by rail to the end of the line at Poydras, and hauled the remaining 12 miles to the plant in a Ford truck. The sacks were unloaded by hand and kept on a wooden platform built on the land-side slope of the levee in line with the batching plant on the other side.

### Concreting Operations

For hauling the batches, five Ford trucks were used, each carrying two batches. All equipment is the property of the contractor. Louisiana Route 1 parallels the levee in this section and earth ramps were cut in the land-side slope of the levee at 600-foot intervals, connecting the road with the levee crown. The Caterpillar power grader



C. & E. M. Photo

T. L. James & Co. set up a Johnson batching plant on the river-side slope of the Promised Land Levee for its concrete wave-wash revetment contract.

cut out the ramps about 10 feet wide on a gentle gradient which the trucks could

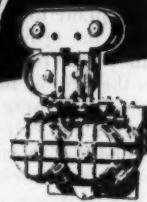
go up and down safely. Only one ramp was in use at a time and this was covered

with a boardwalk made from 2 x 8's used as ties and placed every 5 feet along the ground. On these ties two tracks were laid, each made from two 2 x 8's, mostly gum wood, and fastened with 30-penny nails so that the track could be easily dismantled and moved to the next location as the paver advanced along the levee. One ramp, permanent for the duration of the project, was built in the levee at the batching plant. This ramp, made of boards fitted closely together, extended from the road up the side of the levee at a 45-degree angle and down the other side to the plant. On the way up this ramp from the road, the batch trucks stopped at the cement platform and received five bags of cement for each batch. Loading was done by hand.

The trucks continued up the ramp to the crown of the levee, ran southward a few feet on the crown, and then backed down the ramp on the other side under the bins for their load of sand and gravel. These were weighed by a John-

(Continued on next page)

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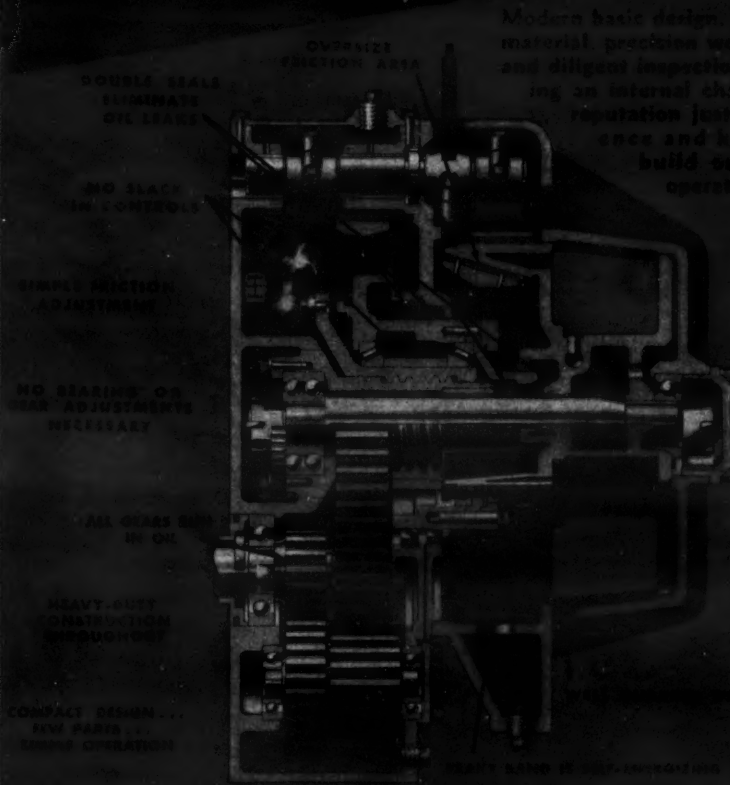
**QUICK-ACTION**—Instantly connected or disconnected with one quarter turn.

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## Levee Paving

(Continued from preceding page)

son beam balance, the dry weight of a typical batch being as follows:

Cement	470 lbs.
Sand	1,595 lbs.
Gravel	2,109 lbs.

The sand used met the following grading requirements:

Standard Sieve Sizes	Weight Passing Per Cent
No. 4	95-100
No. 16	45-80
No. 50	10-30
No. 100	1½-7

The washed gravel was graded according to these sizes:

1½-inch	100
1-inch	90-100
¾-inch	40-70
No. 4	0-6

The maximum amount of water permitted in the mix was 7½ gallons per bag of cement. Each batch yielded about 30 cubic feet of concrete with a slump ranging from ½ to 2 inches, and developed a strength of 3,000 pounds to the square inch in 28 days, or 500 pounds above the compressive strength required.

### Paving the Slabs

When paving the upper end of the levee, which was ¾ mile from the batch plant, a Blaw-Knox turntable was used in front of the paver which operated from the levee crown. The trucks with their two dry batches ran up the ramp from the batch plant to the top of the levee and along the crown to the turntable, where they were turned around for dumping into the skip of the paver. The 10-foot crown was not quite wide enough for this maneuver and, after one of the trucks overturned, the turntable was discarded. The loaded trucks then used the highway to a convenient ramp where they ran up to the levee top and backed to where the paver was operating, unloaded into the skip, went forward to the access ramp, and down to the road for another load.

A Koehring 27-E paver with a 35-foot boom poured the slab from the top of the levee. A 550-gallon water tank mounted on a wooden skid was either dragged along at the rear of the paver or, when the paver was going in the opposite direction, pulled along by a cable fastened to the end of the boom. Water for the concrete was taken from the Mississippi by a Jaeger 4-inch pump placed on the river bank near the batch plant. From a reducer on the pump the water was delivered through 200 feet of 2-inch iron pipe to the crown of the levee, where it filled an 800-gallon tank mounted on a Ford truck. This mobile outfit then supplied the tank accompanying the paver. A Jaeger 2-inch pump with a system of valves, also mounted on the skid, permitted water to be pumped from the supply truck either to the skid tank or directly into the paver tank.

The batches, which were mixed for 1½ minutes, were dumped at the top of the slope first, and as the distance between the forms was only 6 feet, the contractor built baffle plates in the bucket to keep the concrete from spilling out over too large an area when dumping. These plates, which were welded to the sides of the bucket, reduced the opening from 50 to 24 inches, and kept the concrete well within the forms, minimizing the work of the puddlers. The bucket was emptied as it ran out the boom so that the concrete would not have to be dragged down the slope by sheer manpower. Two puddlers and two rakers leveled off the concrete while two finishers removed the steel expansion-joint holders before any screeding was done.

### Finishing and Curing

The concrete was screeded by two men working a 7-foot Jackson vibrating screed from the top of the slope to the bottom. When the toe of the slope was reached, two other men took hold of the

screed and the four men carried it back up the slope for use on the next panel. The gasoline motor and generator which drives this unit was carried along on the paver. As it came from the factory, the screed was 10 feet long so the contractor cut off 3 feet to make it more easily handled on the 6-foot forms. The lessening of the weight was also an advantage when working on the steep slopes. With this screed, a drier concrete could be used which would not have a tendency to creep down the slope as would a wetter mix.

The concrete was finished by two men with long-handle floats, one 9 and the other 12 feet in length. The float boards were 3 feet long x 8 inches wide x 2 inches thick and were worked by these men stationed at the top and bottom of the panel so that they could sweep the full length of the slab between them. Two other finishers with small hand floats and trowels looked after the straightening of the expansion joints. The concrete was covered immediately after the finishing with Tru-Cure curing

compound carried in a 3-gallon tank and sprayed by a hand pump. As a dry mix was used, this curing was of great importance to retain the moisture and prevent the formation of shrinkage cracks. The forms were left on for 24 hours and then moved ahead. Ten days elapsed before the alternate slabs were poured.

Ten days after the final concreting, the toe of the levee was backfilled, covering the lower quarter of the newly paved river-side slope. The material was pushed back by the Caterpillar D7 tractor with a bulldozer, which then pulled a sheepsfoot roller over the new fill, and followed that with a Bros rubber-tire wobble-wheel roller.

### Personnel and Cost

A total force of twenty-five men was used for all operations on this levee paving which was started on December 23, 1944, and was finished on January 20, 1945. The linear distance of 6,200 feet along the levee contained 1,680 "squares", a term used in this type of

work to denote an area of 100 square feet. The cost of this paving was around \$35,280. An average day's pour of the 4-inch non-reinforced concrete slab was 100 squares, while the record pour was 202 squares in one day of 8 hours.

The contract for the slope paving on this Promised Land Levee was awarded to T. L. James & Co., Inc., of Ruston, La., by the U. S. Engineer Office, New Orleans District, of which Colonel George H. Hudson, Corps of Engineers, is District Engineer, and Major A. H. McRae is Executive Assistant to the District Engineer. Walter C. Carey is Chief of the Inspection Division of the District, and J. W. Frankenshuf supervised inspection of construction in the Structures and Revetment Section which includes levee paving. T. J. Stephens was Superintendent for T. L. James & Co. while W. H. Keen was Inspector for the U. S. Engineer Office.

### Other Contracts

Besides this project, many other levee (Concluded on next page)



TUNE IN THE  
TEXACO STAR THEATRE  
WITH JAMES MELTON  
EVERY SUNDAY NIGHT  
—CBS



# TEXACO



## Levee Paving

(Continued from preceding page)

paving jobs were completed during the winter of 1944-45 in order to have the levees protected before the advent of the spring floods. Five contracts totaling 22 items were let for this purpose, covering nearly 16 miles of levees along the Mississippi. T. L. James & Co., Inc., paved 17,060 squares along 55,209 linear feet of levee, all below New Orleans, at a total cost of approximately \$382,200. The R. P. Farnsworth Co., Inc., of New Orleans paved 3,600 squares along 12,458 linear feet of levee, all below New Orleans, at a total cost of approximately \$91,500. The rest of the paving was done by T. W. Kleinpeter of Baton Rouge, and consisted of 6,680 squares along 15,580 linear feet of levee above New Orleans at a total cost of \$130,840. The totals for all paving are:

Squares	27,350
Linear feet of levee	83,247 or 15.8 miles
Cost	\$604,540

Below New Orleans there are still several miles of exposed levees, some of which receive protection from heavy undergrowth, while remnants of wooden revetments are found at the toe of others. With the success of the concrete-slab method of protection against wave wash, these sections may be similarly treated in the near future.

## Mulch—What Is It?

There seems to be some misunderstanding as to the meaning of the word "mulch", due to confusion between farm tillage practices and the operations of roadside-development engineers on highway projects. After considerable discussion with roadside-development engineers and landscape architects, we find practically unanimous agreement as to the types of mulching operations, but still a lack of uniformity in terminology. The latter is already under discussion by at least one committee of the Highway Research Board.

In roadside-development practice

mulch is a surface covering. It is sometimes held in place by twine tied to stakes to prevent its being blown about by the wind or by the passage of motor vehicles at high speed. Another method of "tying" mulch is to press a part of the straw or hay slightly into the surface of the ground by a straight-set disk or Culti-Packer. In this latter method the mulch is worked into the ground only enough to tie it to the ground, and most of the mulch is still on the surface to protect the ground and seedbed from erosion by rain.

Where such materials as peat, muck, sawdust, straw, hay or green manure crop are worked into the ground and mixed throughout a seedbed in order to add organic matter to a heavy clay or other deficient soil, it is in the nature of a soil amendment and is not referred to as mulching in roadside-development practice. The fact that the mixing of organic matter with the soil in farm tillage practice is frequently referred to as "mulching" has been the cause of most of the misunderstanding.

## County Builds Road To Housing Project

Contract Awarded to Depew Paving Co. for Bituminous Macadam Road in Tonawanda, Erie County, N. Y.

THE Highway Department of Erie County, New York, recently rebuilt the mile-long Ensminger Road in the town of Tonawanda just north of Buffalo. The original paving was a 15-year-old light bituminous macadam, 16 feet wide, which broke up under heavy traffic last year when the nearby Sheridan Gardens housing project was under construction. The new road is a 24-foot-wide pavement consisting of a 9-inch layer of slag as a sub-base, on top of which is a 5-inch-thick bottom course of broken slag topped with a 2½-inch course of bituminous plant-mix.

Work began August 21, 1944, on this contract which was awarded to the Depew Paving Co. of Depew, N. Y., for \$51,800, and the job was finished in November. The project began at Two Mile Creek Road and ran easterly one mile to Military Road, N. Y. 265, thereby providing access to the 1,500-unit housing project located at the eastern end of the road.

### Excavation and Drainage

Excavation on this job was unclassified and totaled 11,156 cubic yards, of which about 6,000 yards was wasted. Plenty of room to waste this clay spoil was provided in a swampy area at the eastern end of the project adjacent to the tracks of the New York Central Railroad. Included in the spoil was the old macadam surfacing. Two shovels, a ⅝-yard Lima and a ¾-yard Northwest, loaded to five 5-ton trucks which hauled the material not more than one mile at the farthest point. An International tractor and Bucyrus-Erie bulldozer spread and graded the material as it was dumped. Other excavation included 1,340 cubic yards for drainage trenches and culverts.

Along with the excavating went the installation of drainage structures. In one section, 500 feet of 15-inch plain-concrete pipe was laid as a storm-water drain 20 feet from the center of the pavement. Five culverts were included in this contract: four are of 12-inch, while the fifth is of 18-inch, reinforced-concrete pipe. These culverts are about 42 feet long and are built either with head walls or drop inlets. Along one section 500 feet of 4-inch vitrified-clay pipe underdrain was laid on both sides of the road 2 feet from the edge of the pavement and 18 inches below the foundation course.

### Roadway Construction

The roadway foundation is 25 feet wide and is made up of two courses, each 5 inches thick, of run-of-bank slag which when compacted by rolling with a 10-ton roller was reduced to a thickness of 9 inches. The slag was obtained from steel mills at Buffalo. The top of this foundation course was filled with slag screenings until a tight bond was effected.

The base course, consisting of 5 inches of broken slag 24 feet wide, was laid next. Gradation of this slag ranged from 1½ to 3¾ inches. This course was put down in one layer and rolled and was also filled with slag screenings. It was then given an application of RT-5 tar by a pressure distributor at the rate of 0.5 gallon to the square yard. The bituminous material was allowed to cure for a couple of days before the top course was put on.

The 24-foot top course was placed in two layers consisting of a 1¾-inch lower course of a coarse mix, and a ¾-inch upper course of a fine mix. The mix is

(Concluded on next page)

# SMOOTH

# Rope work

DIGGING drainage channels on the desert to protect the Colorado River Aqueduct from the rare—but extremely heavy—desert rains is one of countless jobs for construction equipment in which smoothly functioning wire rope plays an essential part.

On construction jobs everywhere, smooth wire rope work is essential for efficient, trouble-free operation of draglines, shovels, hoists, etc. Knowing this, experienced contractors always keep wire rope in condition with effective lubrication—Texaco Crater.

Texaco Crater penetrates into and preserves the core of wire rope, preventing collapse. It seals each wire in a tough viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion. Keeps rope strong longer.

Used on open gears, Texaco Crater cushions load shocks, quiets noise, reduces wear. It doesn't channel or throw off, but clings to tooth surfaces, following through from gear to gear, despite high pressures and

temperatures, and peripheral speeds.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available through more than 2300 Texaco distributing plants in the 48 States. Get in touch with the nearest one, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

### THEY PREFER TEXACO

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

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**Lubricants and Fuels**  
FOR ALL CONTRACTORS' EQUIPMENT





## State Legislatures Adjourn, Road Bills

Fourteen of the forty-four state legislatures which assembled this year adjourned as of March 17. They are: Arizona, Arkansas, Georgia, Idaho, Indiana, Montana, North Dakota, Oregon, South Dakota, Tennessee, Utah, Washington, West Virginia, and Wyoming. Constitutional amendments to prohibit diversion of highway-user revenues received the attention of the legislatures of five of these states, with Tennessee and Indiana enacting such legislation. South Dakota enacted favorable anti-diversion legislation but not in the form of a constitutional amendment.

In *Arizona*, HCR 10, an anti-diversion constitutional amendment, failed of enactment.

In *Arkansas*, an extra \$11,000,000 appropriation was set up to make it possible to match Federal Aid in the post-war highway program without the necessity of a special session.

In *Georgia*, both houses passed the Cates Highway Bill which raised the pro rata share of seventy-four counties to the state average in the distribution of gasoline-tax revenue. The original measure provided that every county should receive gasoline-tax funds on the basis of at least 14.13 per cent of its roads. The Senate amendment provided that no county shall receive less than \$17,500, and the House concurred. S. 152, an anti-diversion constitutional amendment, failed of enactment.

In *Idaho*, H. 190, a temporary 1-cent increase in gasoline tax, the revenue from which is earmarked to match Federal-Aid monies, passed both houses but was not signed by the Governor.

In *Indiana*, HJR 4, the anti-diversion constitutional amendment, passed both houses.

*South Dakota's* Senate passed S. 259, prohibiting the diversion of highway revenue, and the bill was approved by the Governor.

*Tennessee* passed SJR 15, an anti-diversion constitutional amendment.

*West Virginia* failed to enact S. 111 and S. 112, proposing diversion of driver's license revenue.

*Wyoming's* anti-diversion constitutional amendment, JHR 5, was withdrawn in the House.

## Asphalt Institute Elects Officers for Coming Year

The Board of Directors of The Asphalt Institute, which represents the major part of the petroleum-asphalt production industry of the United States and Canada, recently held its annual meeting and elected officers for the coming year. H. B. Pullar of the Berry Asphalt Co. will serve as Chairman of the Executive Committee, with Ole Berg, Jr., Union Oil Co. of California; C. E. Cox, Carter Oil Co.; F. R. Field, Standard Oil Co. of New Jersey; A. M. Maxwell, Standard Oil Co. (Ohio); F. V. Widger, Witco Chemical Co.; and J. S. Williams, Rock Island Refining Co., completing the committee.

Herbert Spencer and Bernard E. Gray were reelected President and General Manager-Chief Engineer respectively, and George R. Christie and John N. Smith, both of the Socony-Vacuum Oil Co., will continue to serve as Secretary-Treasurer and Assistant Treasurer. The following Vice Presidents were elected:

F. R. Field for Division 1, Atlantic-Gulf; A. M. Maxwell for Division 2, Ohio-Great Lakes; C. E. Cox for Division 3, Mid-West; J. S. Williams, Division 4, Southwest; and Ole Berg, Jr., for Division 5, Pacific Coast.

During the past year the Institute has opened offices in Division 3 at Billings, Montana, in the Gullard & Wilkins Building, with John R. Banning in charge; in Division 4, at the Petroleum Building, Oklahoma City, with A. J. Kavanaugh in charge; and in Division 5 at Portland, Oregon, in the Wilcox Building, with W. A. Bugge in charge. Additional offices are planned for Division 3 in Chicago and Division 1 in Boston.

## New County Road

(Continued from preceding page)

known as New York State Bituminous Macadam Mixing Method, Type 3, and is a combination of asphalt and stone using a liquefier as a mixing agent. Both layers were placed by an Adnun Black Top Paver and rolled, after which the road was opened to traffic. The aggregate used varied in size from a 1-inch stone down to  $\frac{1}{8}$  inch in the lower course and from  $\frac{1}{2}$  inch to screenings or sand passing the No. 80 screen in the upper course. Asphalt with a penetration of 80 to 100 was used.

The pavement is crowned from the

center on a slope of  $\frac{1}{4}$  inch to the foot. The road has 7-foot shoulders built on a slope of 1 inch to the foot.

## Personnel

Fourteen men were employed on this contract for one mile of plant-mix paving, under the supervision of J. Carl, Superintendent for the Depew Paving Co., Depew, N. Y. Arthur J. Yaw is Superintendent of the Erie County Highway Department, with Edgar W. Earle, Engineer in charge of roads and surveys.

Our five-star military leaders ask you to support our fighting men by buying bonds in the Seventh War Loan Drive.

# Name it

## HARD DIGGING

## BARGE TYPE

## DREDGING

## REHANDLING

FINISHING MACHINES  
FOR ROADS AND AIRPORTS

PAVING SPREADERS  
FOR ROADS AND AIRPORTS

PAVING FORMS  
FOR ROADS AND AIRPORTS

STEEL STIFFS

7 plants of  
Blaw-Knox Company  
have been awarded  
the Army-Navy "E"  
for excellence



### McWhorter New Head Of PRA Division Office

B. P. McWhorter has been appointed Division Engineer in charge of the Public Roads Administration division office at Montgomery, Ala., to direct Federal highway activity in Alabama, Georgia, Florida, Mississippi, and Tennessee, succeeding the late Charles D. Snead. In going to Montgomery, Mr. McWhorter returns to the scene of his first appointment in Public Roads work, since he was Senior Highway Engineer in that office from January, 1934, to August, 1939.

From 1939 until his present appointment he was in charge of the Public

Roads state office in Richmond, directing the Federal highway program in Virginia. He has also served with the State Highway Department of Georgia, his native state, first as an engineer and later as State Highway Engineer from 1930 to 1934.

### Three-In-One Spray Unit

The Littleford No. 101 spray unit, which can operate with a 4-foot spray bar for distributing tar, asphalt, or road oil on highway jobs, with a hand-spray attachment where desired for patching or repairs, or with a draw-off cock for pouring-pot work, is described and illus-

trated in a new 4-page folder. Equipped with two torch-type burners and two U-type return heat flues, this 101 Utility spray unit is reported to have one of the fastest heating systems on the market. A shifting spray bar for extra service is available if specified. The unit comes in two-wheel trailer, four-wheel trailer, and truck-mounted models, with capacities ranging from 300 to 1,200 gallons.

Highway department engineers and contractors may secure copies of this descriptive folder covering the No. 101 and other sprayers by writing direct to Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio, and referring to this item.

### Anthony Co. Appoints Worrells Sales Manager

C. H. Worrells has been appointed General Sales Manager of the Anthony Co., Inc., Streator, Ill., manufacturer of hydraulic hoists, dump bodies, and other steel products for motor trucks. Mr. Worrells has been with the company for twenty years, much of that time serving as Treasurer. In his new post he succeeds R. R. Howard, who has resigned.

Glenn A. Duis, for many years a consultant and director of the company, has been elected Executive Vice President, and will supervise the operative duties for the President.



## THE *Right* BLAW-KNOX CLAMSHELL BUCKET FOR YOUR JOB

You have only to specify the size of crane and kind of work you want a clamshell bucket to do and Blaw-Knox will furnish the proper type and size to meet your particular requirements — do your work efficiently, quickly and at lowest possible cost.

The selection will come from the largest line of clamshell buckets available anywhere — all highly engineered — and field proved to do the job and take the hard knocks of rough usage.

Such outstanding development as the lever arm sheave (instead of ordinary bucket

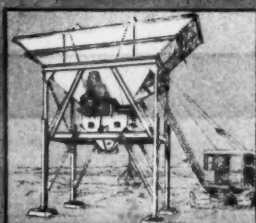
ings) which mean easier operation and longer cable life; proper weight distribution basically designed into the bucket (instead of trying to do it all with counter-weights) which provides greater penetration and digging power; one-piece main hinge which insures and maintains positive scoop alignment at all times — these and many other built-in advantageous features of bucket design become yours when you buy a Blaw-Knox Clamshell Bucket for your job.

Your nearest Blaw-Knox Dealer will help you select the bucket you need.

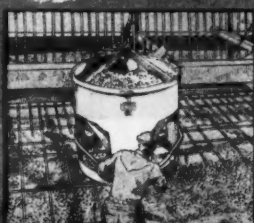
Send for Catalog 1937 — A complete data book on Blaw-Knox Two-line Clamshell Buckets

# BLAW-KNOX

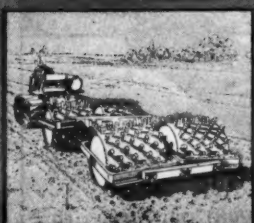
BLAW-KNOX DIVISION  
OF BLAW-KNOX COMPANY  
2067 Farmers Bank Bldg., Pittsburgh, Pa.  
NEW YORK • CHICAGO • PHILADELPHIA  
BIRMINGHAM • WASHINGTON  
Representatives in Foreign Cities



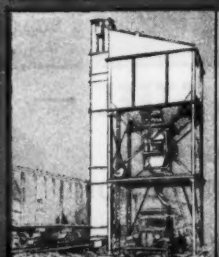
AGGREGATE  
BATCHING PLANTS



CONCRETE BUCKETS



SHEEPFOOT  
TAMPING ROLLERS



BULK CEMENT PLANTS



## Prompt Designation Of Interstate Routes

In accordance with the Federal-Aid Highway Act of 1944, Thomas H. MacDonald, Commissioner of Public Roads, has requested the various state highway departments to proceed at once with the designation of routes for inclusion in the National System of Interstate Highways. The Act requires that "there shall be designated within the continental United States a National System of Interstate Highways, not exceeding 40,000 miles in total extent, so located as to connect, by routes as direct as practicable, the principal metropolitan areas, cities, and industrial centers, to serve the national defense and to connect at suitable border points with routes of continental importance in the Dominion of Canada and the Republic of Mexico".

The routes are to be selected by joint action of the state highway department of each state with the adjoining states and are to be approved by the Adminis-

trator of the Federal Works Agency. In making the announcement, Commissioner MacDonald said, "Designation of the system is an important step towards launching a large post-war highway program. Construction of such a system is an outstanding feature of the long-range highway program".

The state highway departments are asked to submit to the Public Roads Administration, by July 1, 1945, maps showing the routes tentatively designated, accompanied by data indicative of the merits of these routes.

## Construction Steps In Bituminous Paving

The relative advantages of fourteen different types of bituminous paving treatment are discussed, together with methods of application and tables showing road-tar designations, applications, temperatures, and uses as well as recommended aggregate gradations in a new 16-page brochure "Surfacing with

Tarmac" issued by Koppers Co., Inc., Tar & Chemical Division, Koppers Bldg., Pittsburgh 19, Pa.

The various treatments described include soil-stabilized base courses; prime coating; double bituminous surface treatment, both cold and hot applications, on sheet asphalt, bituminous concrete, portland-cement concrete or bricks; drag leveling courses; mulch treatment; both graded and coarse-aggregate road mixes; retreatments and seal coats; penetration macadam; hot-laid tar concrete; and general repairs.

A copy of this 8½ x 11-inch illustrated booklet may be secured direct from Koppers by mentioning this review.

## Heavy-Duty Vibrator

Vibrating huge volumes of harsh stiff concrete, such as are placed during the construction of large dams, requires the use of a really heavy-duty vibrator. The Jackson VS-4 concrete vibrator, which was used on such jobs as the dams of the Tennessee Valley Authority, Madden Dam in the Canal Zone, Grand Coulee Dam in Washington, and many other smaller lock and dam projects on the Mississippi, is described completely, with specifications, in a new illustrated folder VS4-244. Copies will be furnished promptly to those writing direct to the Electric Tamper & Equipment Co., Ludington, Mich., and mentioning this item.



**YES SIR, Sterlings  
Sure Come in Handy!**

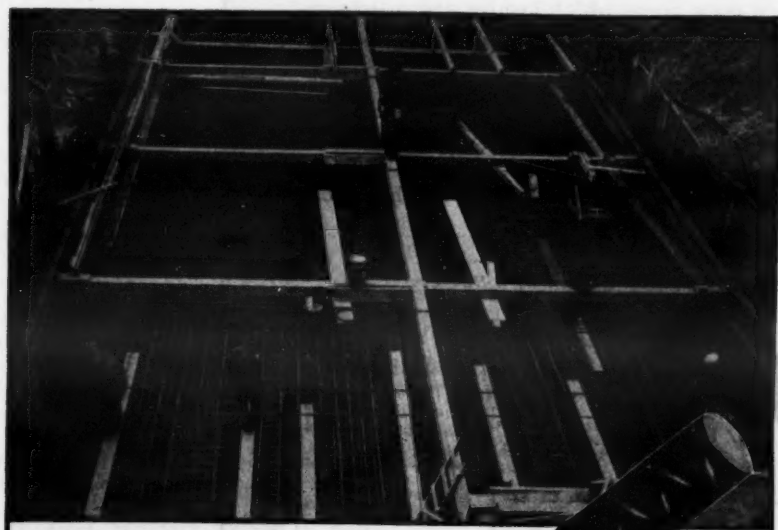
"Those husky Sterling Wheelbarrows we were fortunate to have on hand are doing a mighty swell job . . . hauling vital War materials and in many ways helping to relieve the manpower shortage. Too bad more Sterlings are not available at present, but we're looking forward to securing some more after hostilities cease."

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of  
STERLING Quality

**Sterling**  
WHEELBARROWS

A 4726-36



## REINFORCING STEEL —

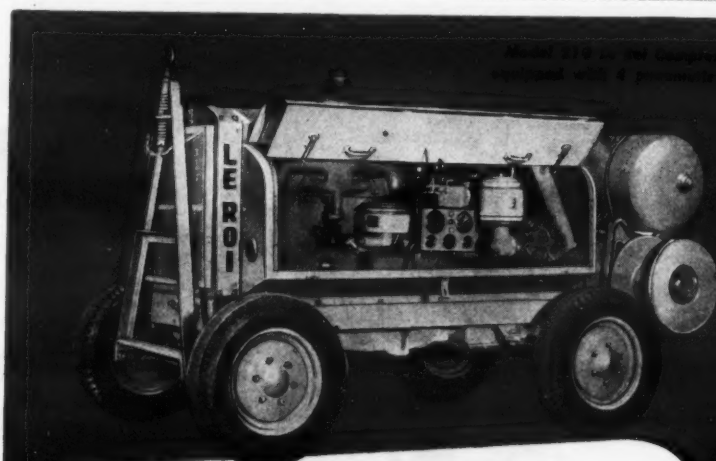
THE REAL STRENGTH OF  
CONCRETE CONSTRUCTION



AVAILABLE NOW IN BILLET OR RAIL STEEL GRADE—STRAIGHT OR FABRICATED

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**LE ROI**  
Portable Air Compressors  
are "Le Roi-powered"  
to give you more air . . . faster!

You save time and money on fast-moving schedules — when Le Roi Compressors with dependable "Le Roi power" are on the job.

With Le Roi Power, you avoid complicated and costly overhaul jobs because of quick-maintenance features such as removable wet sleeve cylinders, hardened valve seat inserts, valve-in-head construction, and many others. You get the benefit of design and construction features that give you plenty of power to build pressure — with an extra margin of reserve for the pinches.

Le Roi is the only make in which the same manufacturer builds both engine and compressor—a perfect team, designed and built to work together.

Ask your nearby Le Roi distributor for all the details, or write for bulletins.

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## Jap Peace Term for the U. S.

"Steel and oil production to be permitted on a reduced scale only."

**ARE YOU BUYING YOUR SHARE OF BONDS?**



# A Quarter Century Of Airport History

## Development of Aviation In United States Has Been Great but Sporadic; CAA Plan Augurs Bright Future

By T. P. WRIGHT, Administrator of Civil Aeronautics

IN this country we are on the verge of an important change in our national policy regarding the construction of airports. If Congress approves the suggestions which the Civil Aeronautics Administration made in its recent National Airport Plan, we can start to work on a new concept of an integrated system of airports for the nation.

Thus far, circumstances have prevented our development of the airport program in a completely logical manner. We have known all along that each airport is important in direct proportion to the number and adequacy of all other airports, but we have not been able to plan on a nation-wide basis. Airport history has been confused.

There was a steady rise in the number of airports between 1920 and 1927. It was in this period that local interest initiated construction of airports. Their chief proponents were barnstorming pilots using surplus wartime planes and early models of commercial planes, and who often settled down in one locality to establish an aviation business. The Federal aviation agency did not come into being until 1926, and airports were one of its first responsibilities.

Beginning in 1925, the Ford Reliability Tours, originating in Detroit and flying to scores of cities throughout the country, contributed powerfully to the public consciousness of the need for airports. Between 1926 and 1927, for example, the number of our airports jumped from 823 to 1,073. Then Lindbergh flew the Atlantic in 1927, and made his tour of the country upon his arrival home, and gave another spurt to public interest in landing fields. This was a great period, 1927 to 1932. Cities and towns built airports following the "expert advice" of almost anybody in aviation. Mistakes were made, of course, but the aroused interest in aviation did help to promote flying, even though we were not all going in the same direction under a national plan.

In 1929, we produced 5,357 planes; then the bottom dropped out, and in 1932 we built 550. We had a lot of airports on our hands, and very few airplanes on our hands. Scheduled air transport kept going, especially the air mail, and the Airports and Aeronautics Information Section of the Aeronautics Branch of the Department of Commerce began the first assembly of technical and engineering data on which to build a national airport program.

Up to 1926, 63 per cent of the cost of an airport was in the land. This proportion dropped until, in 1936, it was about 26 per cent. In that year, only 10 per cent of the airports were scheduled operation terminals and they represented 47 per cent of the capital invested.

### Federal Participation in 1933

The first Federal participation in the airport program was in 1933 when the Civil Works Administration, at the instigation of the Bureau of Air Commerce, designated airports as eligible projects in the Federal relief works program. During its life, the CWA spent \$9,388,857 on 952 airport projects, 70 per cent being spent on small local airports. Later, the Federal Emergency Relief Administration absorbed the CWA and in about a year, before it was merged into the Works Progress Administration, it spent \$17,565,890 on 954 airport projects, again using 64 per cent of the money on small fields. Federal agencies spent some \$70,000,000 on airports in all programs up to 1936.

Circumstances precluded comprehen-



Pan American Airways Photo

In the next quarter century, transport and cargo planes will be taking off and landing not only from thousands of airports in this country but in all sections of the globe.

sive planning in these programs. The impelling motive was to produce work for people who could find none elsewhere. We still are using some of the airports that were built by relief labor in those days, and what looked like money thrown away has proved to be an invest-

ment. Without this Federal aid, we would not today have nearly as many airports.

During this program, the Bureau of Commerce was providing technical supervision in the construction of airports.

(Continued on next page)

**A BIG**

*material handling field*

**1**

**2**

**3**

**PMCO all-purpose**

## SHOVEL DIPPERS PULL SHOVEL DIPPERS DRAGLINE BUCKETS

**All 3 have these distinctive PMCO features—**

1. FULL LENGTH, ONE-PIECE, 14% MANGANESE STEEL FRONTS AND BOTTOMS that develop tensile strengths up to 140,000 lbs.
2. WIDE SET CORNER TEETH break up material, leaving only scooping up function for lip to perform.
3. MANGANESE STEEL TEETH ARE REVERSIBLE AND TAPERED SOCKET TYPE kept tight by digging pressure, but easily removed by light tapping from behind.
4. CURVED BACKS ASSURE FULL LOADS by eliminating hard-to-fill corners.
5. TAPERED BODY SECTIONS ASSURE EASY DUMPING of wet, sticky material.
6. WELDED FABRICATION OF BODY SECTIONS ELIMINATES BURDENSOME WEIGHT UP TO 50% . . . . . permitting greater pay loads, longer booms, and greater speed in operation.

On the 1/2 yd. and 3/4 yd. sizes of Shovel Dippers, Drag Buckets, and Pull Shovel Dippers all teeth are interchangeable . . . a great convenience to operators.

**PETTIBONE  
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CORPORATION**

"Quality Since 1880"

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PRECISION AIRCRAFT ENGINE PARTS  
COMMERCIAL HEAT TREATING  
SEASONING OF STEEL  
NITRIDING—A SPECIALTY

CADMIUM, ZINC, TIN and  
HARD CHROME PLATING

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A Complete Manufacturing Plant

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Muskegon, Michigan

Sales Office: 1402 Kales Bldg., Detroit 26, Mich.



## A Quarter Century Of Airport History

(Continued from preceding page)

The requirements of air transport indicated larger fields were necessary. Larger passenger planes were produced, with different landing characteristics, and the old type of field which could be installed on almost any plot of 40 acres became inadequate.

The next major development in airport history was the Airport Survey of 1939, performed by the CAA, and resulting in recommendations to Congress that the Federal government ought to participate financially in the construction of airports, and that development of an adequate airport system should be recognized as a matter of national concern. The survey also recommended that the highest importance be given to safe and efficient operation of fields in the interest of air transport and national defense, and that airports be recognized as eligible relief projects. It proposed that no Federal funds be expended to operate and maintain airports.

From 1933 to 1938, the Federal contribution to airports accounted for 77 per cent of their cost. In 1938 alone, the Federal government spent \$25,200,000 on airports. An estimate of the value of the airports in this country in 1939 was \$327,500,000. Of this, cities had spent \$101,500,000 and the Federal government \$140,000,000.

### War Construction

Circumstances again prevented action on the 1939 survey. War clouds were already gathering and airports began to assume increasing importance as fighting tools. Before action could be initiated on its recommendations, the Army and Navy asked the CAA to take over construction of public airports needed for defense.

In this program, just now being concluded, \$400,000,000 was spent in the course of three years, and again, the CAA was not able to establish a national airport plan and follow it. Military airports had to be of a certain number and strategically placed, and the airport needs for civil use by individual communities of the nation were of secondary importance.

Under the defense airport program of the Civil Aeronautics Administration, only those projects which had future civil use were assigned to the CAA and built by them. Because of military requirements, these were almost entirely in the large-airport class.

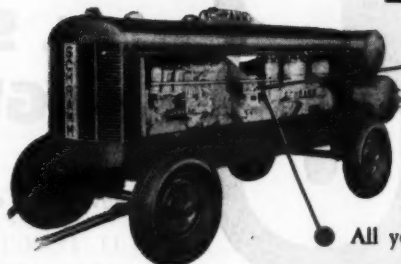
As a result, although we have a substantial proportion of large airports, a

(Concluded on next page)



## Compressed Air...

EVERY TIME THE BUTTON IS PUSHED!



● All you have to do is push a button . . . and get all the air you need with a Schramm Air Compressor!

This is a feature worth having in an air compressor. In addition, Schramms are lightweight, easy to move about, and are 100 per cent watercooled to provide ideal performance both summer and winter.

Four Schramms were used on the road construction job illustrated above. It is only one of many jobs where Schramm was specified to do the job. Air obtained easily . . . constantly . . . that's what makes your construction job easier. If you use compressed air, it will pay you to write for descriptive literature and details.

# SCHRAMM INC.

THE COMPRESSOR PEOPLE  
WEST CHESTER  
PENNSYLVANIA



## Save for Your Country . . . Save for Yourself!

THE Battle of Japan has just begun. There are 101 ways in which your dollars are needed more than ever to bring America's might to its full strength—so that we may crush our foe the faster, make an end of killing, and bring our men back home.

By investing in the 7th War Loan, you are safeguarding your country's future—and your own.

By putting every dollar over rock-bottom expenses into the purchase of War Bonds, you are also helping to deliver a body blow to wartime Inflation—thus putting a lid on the cost of living and maintaining intact the purchasing power of the dollar. At the same time, you are insuring the country and yourself against the catastrophe of a possible postwar Deflation—with its depression, unemployment, misery and heartache.

So save for your country—save for yourself. In helping your country, you are also helping yourself! Come peace, we'll all need money for education, replacements, retirement, new homes, a new start—and we'll need a lot of it. And there isn't a better or safer highroad to your goal than United States War Bonds.

LET'S GO . . . PUT THE BIG DRIVE OVER!



## A Quarter Century Of Airport History

(Continued from preceding page)

few "holes" are left in the national system which our current airport plan proposes to fill with the construction of about 100 additional large airports, and improvements to 471 existing ones.

In this war period some airports have been built by the Army and Navy for which there will be very little use in civil life. These were necessary in military plans for defense, and if they prove to be useless in peacetime, they will have to be considered as part of the waste of war.

### The Future of Airports

Now, in 1945, we are at last in a position to make a comprehensive national plan for our airports and stick to it. Previous experience convinces us that some new set of circumstances can arise and prevent it again. We can only hope that after the war we do not have a depression which will again throw our airport plan into a work-relief program.

Airports can have a great economic importance in our post-war world. They will have such importance if three conditions are met. One of these conditions is squarely in the lap of the CAA. The second is squarely in the lap of the aviation industry; and I suppose the third rests in the lap of one of the Fates who sits with her sisters spinning the threads of our lives. These conditions are:

1. If we have enough airports, they can be of great economic importance to this country. Every airport is important in relation to the number of other airports in existence. The CAA has planned, we believe, an adequate number of airports to make possible all the travel by our citizens on scheduled and non-scheduled flights in the foreseeable future. We may have underestimated the number we shall need; if so, the fault can be remedied, for the plan is flexible.

2. If we have the kind of airplanes which the people will buy and fly in volume, airports will be of great economic importance. This is industry's problem. I do not believe the people will buy the kind of airplane we had before the war in any great numbers for an indefinite time. The industry must produce a plane which is more useful and which a larger number of people can afford to buy and fly. The CAA has plans under way to cooperate with industry in the development of important features of such an air vehicle, and I believe we can expect harmonious Government-industry activity in this direction.

3. If the economic level of the average man is high enough for him to afford a reasonably priced airplane, the airport program will be of great economic importance. This condition may be affected by all of us, including industry and government, and it is the biggest "if" in the whole picture.

Our airport plan proposes the construction of 3,050 new airports and improvement of 1,625 existing fields, at an estimated cost of \$1,021,567,945 for clearing, grading, paving, lighting and radio facilities, plus about \$230,000,000 for land and buildings, other than

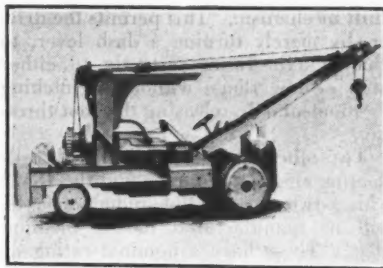
hangars.

For the first time, the CAA has suggested that a system of Federal aid be inaugurated, matching with Federal money that invested by the states and communities. Thus, we would invest a total of \$1,250,000,000 in airports in a period of ten years, half of it borne by the Federal government, and half by the local sponsors.

This plan is comprehensive. In general, it will place an airport wherever one is needed, and of the size necessary for that community's flying. It will make possible widespread travel in private planes, and will produce adequate facilities for an expanding air-passenger and air-freight business.

### Self-Propelled Crane For Yard Services

Two models of the Lohse tractor-crane for tough load-handling jobs in yards are illustrated and described in detail in Bulletin 52 recently issued by Henry



A Lohse Model 6RC tractor-crane.

Lohse Co., Inc., 50 Roanoke Ave., Newark, N. J. Both the Models 6R and 6RC are mounted on International I-6 tractors.

The R model has a turning radius of 18 feet 3 inches, while the RC, equipped with caster wheels, has a turning radius of 12 feet 7 inches. Both are equipped with hydraulic foot brakes on the driving wheels and also with mechanical individual hand brakes on the countershaft. The dual winch is hydraulic-operated so that the boom and load can be smoothly spotted.

Copies of the bulletin referred to may be secured by writing direct to the manufacturer and mentioning this item.

### Nunneley Joins Canadian Firm as General Manager

The Powell Equipment Co. Ltd., Winnipeg, Canada, has recently appointed Fred G. Nunneley as its General Manager. Mr. Nunneley, a native of London, England, came to America in 1909 and settled in southern Saskatchewan. After serving with the Canadian Expeditionary Force during World War I, he returned to Canada in 1919, becoming first an instructor in farm mechanics for the unit handling the civil reestablishment of soldiers, and later was associated with the Ford Motor Co. of Canada.

In 1928 Mr. Nunneley was appointed a district representative for Caterpillar equipment in the Canadian territory, was made Assistant Sales Manager in 1931, and from 1935 until his present appointment, he was Canadian Sales Manager for Caterpillar.



Winter's gone—but it can't be forgotten! Worst in years, this past winter proved crippling to communities with inadequate snow removal equipment.

Remember—in six short months, winter returns. To be fully prepared in time, you've got to start right NOW—planning equipment needs and ordering early!

Make the right start by ordering the most outstanding of all snow removal equipment—Walter Snow

Fighters . . . the trucks that do the "impossible" in snow clearance according to highway and airport officials. Specially engineered, and featuring the exclusive 4-Point Positive Drive, Walter Snow Fighters give you a combination of great power—traction—speed—and ruggedness found in no other truck.

To keep your roads open in the severest blizzards next winter, equip with Walter Snow Fighters. Act now. See your Walter distributor or write us for detailed literature.

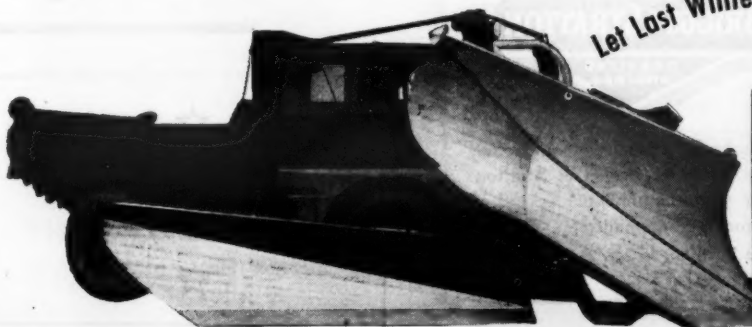
WALTER MOTOR TRUCK CO., 1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

**COMPLETE**  
WELL POINT SYSTEMS  
WILL DRY UP ANY  
EXCAVATION

Faster—More Economically  
Write for Job Estimate and Literature

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MACHINERY & EQUIPMENT CO., Inc.  
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Tel. IRonsides 6-8600



Let Last Winter's Lesson be Next Winter's Warning!

**WALTER**  
**SNOW FIGHTERS**





One of the Federal heavy-duty trucks available for essential civilian use.

### Commercial Trucks For Civilian Service

Ten different models of Federal commercial trucks for essential civilian use were authorized by WPB and will be produced by Federal Motor Truck Co., Detroit 9, Mich., during 1945. These trucks are already in daily production alongside heavy-duty military vehicles on the same assembly line.

Federal Model 45M2 has a two-speed double-reduction axle and a gross vehicle weight of 24,000 pounds, and will be equipped with a new vacuum-control

shift mechanism. This permits the driver, by merely turning a dash lever, to change axle ratios instantly to either high or low range without declutching by momentarily releasing the foot throttle.

Two other models, the 18M with full-floating single-speed axle, and the 18M2 with a two-speed double-reduction axle, will be manufactured in the medium class. These have a nominal rating of 2 to 3 tons each, with gross vehicle weights of 15,000 pounds each. There will be three 29M series models representing the light-heavy field, having nominal ratings of 3 to 4 tons and gross vehicle weights of 20,000 pounds each.

Five models in the heavy-duty class will have nominal ratings from 3½ to 7 tons and gross vehicle weights of 24,000 to 28,000 pounds. These units will be the Model 45M with a full-floating bevel-gear axle, the 45M2 with a two-speed double-reduction axle, the Model 55M with a single-speed double-reduction axle, and the 55MA and 60MA units which will be equipped with

full-floating double-reduction axles and auxiliary transmissions.

Complete information on these models may be secured by writing direct to Federal and mentioning this illustrated news item, or by contacting the nearest Federal truck dealer.

### New Folder Describes Line of Clamps for Hose

A new 4-page folder with illustrations and text describing many applications of Punch-Lok safety clamps for banding hose or splicing cable has been issued

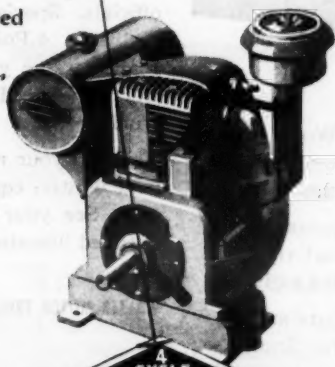
by The B. F. Goodrich Co., Akron, Ohio. These clamps are available in two types, the pre-formed complete rings which are shaped to slip over the ends of hose, nipples, connections, or other sections to be joined, and the open-end straight bands made to permit curving around hose, cable, or other objects that need binding.

The broadside, which describes and illustrates the safety and time-saving features of the clamps, may be secured by writing direct to the Industrial Products Sales Division of B. F. Goodrich and mentioning this review.



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## Concreting Operations For Montana Tunnel

(Continued from page 2)

Initially the west end of the third deck was used for handling cement in cloth sacks, hauled from railroad cars as needed and dumped by two men, 5 sacks at a time with 5 pounds of Pozzolite, into a rubber-tired wheelbarrow which was then emptied by a third man into the 24-inch steel pipe which led to the concrete mixer. Weatherproof storage for a small amount of cement was available at this level but was little used as cement was ordinarily hauled from the cars at only little more than its rate of use. As soon as the equipment could be obtained, cement was handled in bulk by a Fuller-Kinyon Type B cement unloader. This air unloader blew the bulk cement to a 200-barrel storage tank above the third deck of the concrete plant. From here it flowed by gravity to the scales, and was weighed. From this point it could be either dumped into the Smith central mixer, or batch-hauled to the paver.

Water for the concrete flowed by gravity from a small impounding reservoir on a stream higher on the hillside into two 80-gallon steel tanks set on the ground about 15 feet higher than the top deck of the plant. Situated so they could be easily heated by a torch or even by a fire built around them, these tanks discharged by gravity into the measuring tank of the concrete mixer.

Light for night operations was provided by 1,000-watt bulbs mounted on poles and so arranged as to illuminate the stockpiles as well as the proportioning and mixing plant. Current for the lights came from nearby commercial power lines.

### Pouring the East Portal

The first concreting operation was the pouring of the foundations and wing walls at the east portal of the tunnel. The wing walls are gravity-type retaining walls, containing 492 cubic yards of concrete each, set at angles of 22 degrees with the face of the portal wall. For this pour, located only 300 feet from the concrete plant, the Smith mixer was used. Concrete discharged from it was chuted into a Rex Pumpcrete set at the west end of the proportioning plant and delivered through a 6-inch Pumpcrete line to the forms. Some operational delays occurred so that this concrete was placed at an average rate of only 13½ cubic yards per hour.

For the second increment of concrete placing, the portal wall with the first 40 feet of tunnel lining, a somewhat different system was used. Aggregates and cement were fed to the Smith mixer as before, but the mixed concrete, instead of being delivered to the Pumpcrete machine, was dumped into three steel-body dump trucks, two batches per load. These trucks hauled the mixed concrete to a Pressweld pneumatic placer set up 25 feet inside the tunnel. The placer discharged through a 6-inch line extended to the top of the arched tunnel lining and the concrete was directed to alternate sides of the 40-foot tunnel-lining form No. 1 (See description of forms later in article) and worked into place by labor-

ers using electrically powered vibrators. This pour of 488 cubic yards was completed in 26 hours at an average rate of 18 yards per hour.

Because of the somewhat unstable rock at the tunnel entrance, the first 40 feet of lining was placed integrally with the portal, made 3 feet thick and reinforced with two lines of 7/8-inch round rods set vertically at 12-inch centers and 1/2-inch round rods set horizontally at 24-inch centers.

### Pouring the West Portal

Because of its location in more stable solid rock, the west portal differs in design from the east portal. It consists of a single wall placed at right angles to the center line of the track with only 14 feet of tunnel lining poured integrally with it. The corners where the vertical wall joins the tunnel lining were heavily strengthened with plain-concrete fillets extending 12 to 15 feet inside the corner.

The portal form, built against a 14-foot section of 40-foot rolling tunnel-lining form No. 2, was made of 1 x 8-



The side-hill concrete proportioning and mixing plant for the Bozeman tunnel was set up on the north bank of the east approach cut.

inch horizontal shiplap held in place by 4 x 4-inch studs at 16-inch centers. Horizontal wales of double 4 x 8's were set at 4-foot centers, their outer ends tied into the rock walls of the cut and braced against them by 6 x 6-inch struts.

At each side of the tunnel entrance,

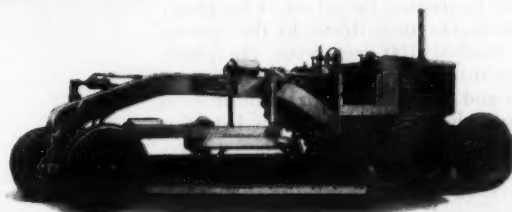
which could not be obstructed by form work interfering with tunneling operations still in progress, a 12 x 12-inch post 36 feet long was set vertically to hold the inner ends of the horizontal wales. These posts were heavily strutted to the rocky sides of the cut and likewise held by 12 x 12-inch diagonal braces extending to the ground from points 27 feet above their lower ends. Their tops were anchored by cables to the permanent timbering inside the tunnel. The wales, in addition to being held at each of their ends, were tied by 3/8-inch rods run at 2-foot centers to the first 12 x 12-inch post of the permanent tunnel timbering 14 feet from the face of the form. The bottoms of these permanent posts were set in the concrete of the tunnel curb and the rods from them to the horizontal wales were fastened by set-screw clamps.

For mixing the concrete for the west portal, a still different system was used to take advantage of the terrain. The method chosen was dictated also by the

(Continued on next page)

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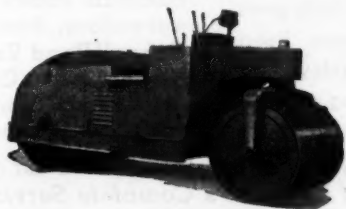


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U. S. Signal Corps Photo

Galion Tandem roller (below). A Galion 3-wheel Chief roller is shown above.



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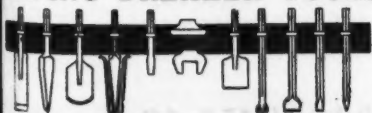
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# Montana Tunnel

(Continued from preceding page)

fact that the tunnel operations were not completed when the west portal was poured, and concrete or aggregates for it had to be transported over Bozeman Pass from the proportioning plant at the east portal to the west end.

A Koehring 34-E electrically powered Twinbatch paver, later used for work inside the tunnel, was placed on top of the cut above the tunnel 40 feet above the top of the portal form and 80 feet east of it. A sheet-metal chute made of a half section of the 22-inch blower line used in the tunnel ventilating system was run from the paver to the top of the form, supported by 2 x 6-inch runners under its edges spanning 12 feet between cross-braced bents of 4 x 4's. Lateral chutes of similar construction and support carried the concrete to hoppers at the right and left sides of the form from which 8-inch sectional elephant-trunk pipes delivered it to its final position. Water for the mixer was obtained from the 2-inch water line running to the west portal for use in the tunneling operations.

Operations at the proportioning plant were changed, in respect to the handling of cement, during this pour. Sand and gravel were handled as before, the weighed batches being delivered to three 2-batch and two 3-batch trucks, through chutes by-passing the mixer at the plant. These trucks then drove to the cement car, spotted 100 feet from the plant, where three men dumped 6 sacks of cement and 6 pounds of Pozzolite on each batch. Others employed on dry batching at the plant included the weigher, a shoveler on the sand chute, and a man on the ground to spot the truck for proper delivery from the chute.

Forces for concreting at the west portal included the paver operator, a truck dumper, two chute men, and four concrete handlers using shovels and vibrators inside the forms. The first pour at the west portal, extending 14 feet into the tunnel and up to the construction joint at the spring line of the roof arch, contained 314 cubic yards and was completed in 12 hours. The final pour, above the joint, was 110 cubic yards and required 5½ hours for its completion.

## Curb and Tunnel Floor

After the concrete had been placed in both portal structures, concreting was suspended until completion of the tunnel bore and final aligning and tightening of all timbering to be left in place behind the concrete lining.

The next procedure was pouring the two concrete curb sections which serve as the lower corners of the concrete lining. Each section, approximately 4½ feet wide and 2 feet 10 inches high, forms a 34-inch-deep stub of the outside



C. & E. M. Photo

The east portal of the Bozeman tunnel with the first 40 feet of tunnel lining completed, just before the rolling tunnel-lining form was removed.

wall, a flume 1 foot wide and 22 inches deep for handling tunnel drainage, and a ballast-retaining curb 15 inches thick and 30 inches high between the flume and the ballast. It was poured with a key

for the slab.

This concrete was poured into sectional wood forms 10 feet long, braced to the permanent tunnel timbering and moved ahead as the concreting proceeded from east to west through the length of the tunnel, this corner section being poured on both sides simultaneously. Ahead of pouring, the rock was cleaned by an air jet to remove any debris, all loose rock having been cleaned off before the curb forms were erected. Concrete for the curb and tunnel floor was mixed in the central plant, and transported to the forms in 4-yard truck mixers and also in 1-yard hoppers mounted on 2-ton trucks. Two truck mixers were used at all times, with three hopper trucks being used whenever their capacity was required. Truck-passing places in the tunnel were provided by leaving out sections of the curbs about every 600 feet. The 3-inch-slump concrete was vibrated in the forms.

The floor slab is nominally 8 inches thick at the center and 15 inches where it joins the curb, and is unreinforced ex-

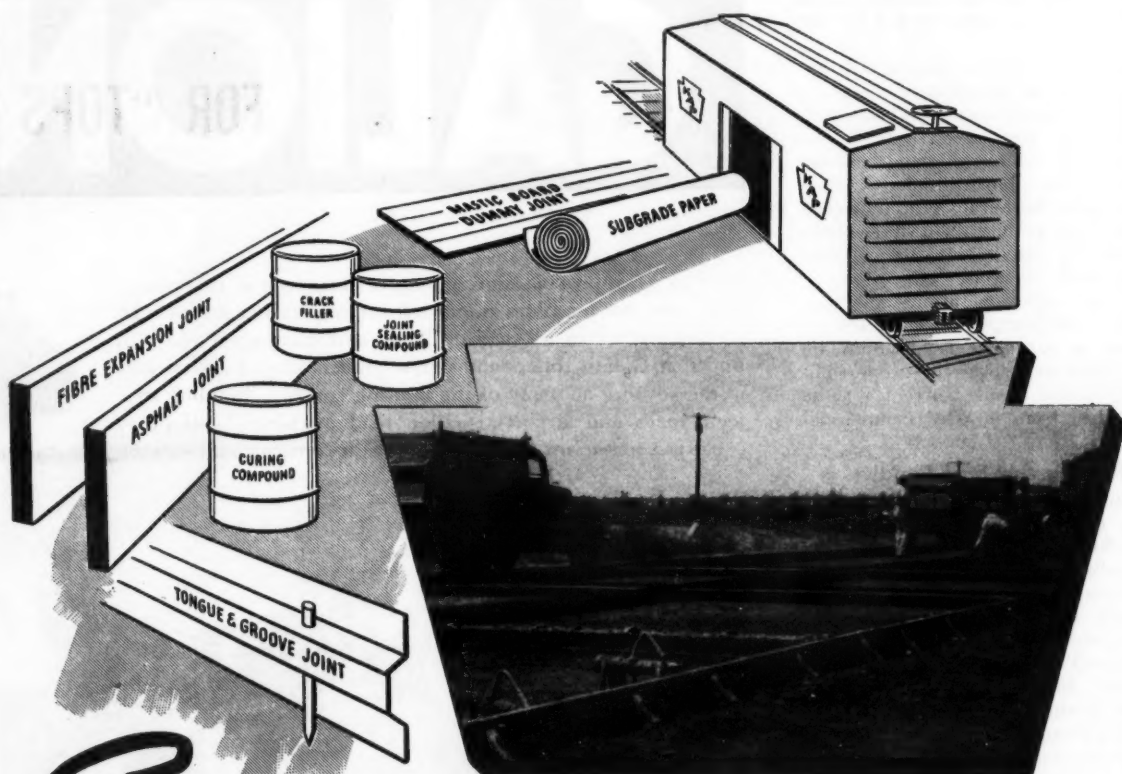
cept for areas of soft foundation. Overbreak in the floor increases the thickness to over 1 foot at the center in some sections.

## Drainage

Before the pouring of the tunnel walls was started, work was under way to collect seepage water in the tunnel and carry it to the side flumes provided in the curb sections. Where the flow of underground water was fairly concentrated, 2-inch boiler tubes were inserted at intervals into the water-bearing seams. The ends of these tubes were driven in sufficiently to support the weight of the vertical section used to conduct the water down behind the tunnel lining, and through it into the drainage flume. The 2-inch boiler tubes empty into 4-inch weep holes, also of boiler tubing, placed during the pouring of the concrete curb and stub-wall section.

In three locations in the tunnel where the seepage was heavy, not from seams but from areas, pans of 26-gage metal

(Continued on next page)



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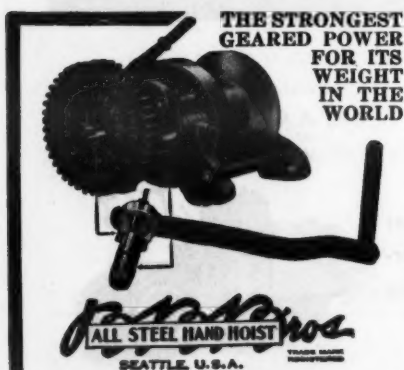
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# Montana Tunnel

(Continued from preceding page)

were placed to intercept the seepage, collect it, and convey it to the downspouts.

## Rolling Forms for Lining

After the tunnel floor had been placed and the water intercepted, pouring of the walls and arched top was commenced. For this work the contractor provided two 40-foot sections of rolling steel and timber forms of his own design. Modified considerably by the shortage of critical steel, the forms, combining structural members and lumber, were fabricated by the Noble Co. of Oakland, Calif.

Each 40-foot section consisted of seven pairs of 12-inch I-beam verticals, their tops joined by two quarter-circle trussed arches of 3-inch channels. The inner flanges and part of the webs were cut away at the post bottoms and a 3/4 x 6 x 12-inch base plate welded to them. At the tops of the vertical posts the opposite pairs were connected horizontally by double 8-inch channels, with removable pins to fasten them to plates welded to the uprights.

Beneath the first, third, fifth, and seventh pairs of vertical posts were 10-inch-diameter flanged wheels on stub axles supported by 7-inch angles welded to the inside flanges of the I-beams. From a 3/4-inch plate welded to form a gusset between the angle legs, Joyce ratchet trench jacks with 1 1/2-inch horizontal extension rods crossed the tunnel between opposite pairs of uprights. The wheels were so spaced as to permit them to roll on light rails set on the curbs of the concrete corner sections. When running on the track, the cut-away lower ends of the 12-inch I-beam posts projected into the concrete drainage flume and traveled along it as the form was moved.

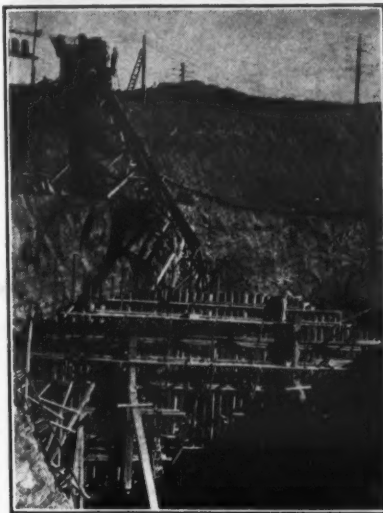
Midway between the vertical 12-inch steel posts, auxiliary wood ribs of double 4 x 10's were placed vertically. These were topped with double 2 x 12's cut to a radius to form quarter-circle arches. Pairs of these, butted against double 4 x 10-inch longitudinal wales at the top center, formed the half circle of the arched top of the tunnel.

Double 4 x 10's were used for longitudinal wales at the mid-point of the vertical height and at the spring line of the

arch just above the channel cross braces. These wales were held firmly against the inside flange of the I-beam verticals by two 5/8-inch bolts and similarly to 1/2 x 6 x 6-inch cover plates on the wooden wales, and served to strengthen the intermediate wooden ribs and hold them in proper alignment.

The forms were faced with 3 x 12-inch lumber laid horizontally from the bottom to points one-third of the way around the top semicircular arch. The top center third was faced with steel plate supported by eight steel channels extending longitudinally between the steel arch ribs. In these plates were six removable ports, 1 1/2 x 2 feet in size, staggered on opposite sides of the top center line between the steel verticals.

After being rolled into position for a pour, the form was raised about 8 inches above the rail on which it was moved by ten small hydraulic jacks. Hardwood blocks and wedges were inserted between the bottom of the drainage flume and the bearing plates on the bottoms of the vertical posts, after which the jacks were



The west portal of the Bozeman tunnel was poured with concrete chuted from a paver set up 40 feet above the forms and 80 feet east of it.

removed. The exact top width was main-

tained by the transverse channel braces and the bottom width adjusted by the Joyce jacks and then held by 4 x 8-inch spreaders set between opposite vertical posts. A timber bulkhead was set to close the space at the forward end of the form, with concrete previously placed closing the other end, and placing of concrete was commenced by a paver and pneumatic placer in tandem.

## Concreting

Batches from the east-portal proportioning plant were hauled into the tunnel in five to six 3-batch Mack diesel trucks, the larger number being required at the beginning of the pours when the forms were at the westerly end of the tunnel. Concreting progressed from west to east. The batches were mixed in the same Koehring paver previously mentioned, water being secured from the 2-inch water line used throughout tunneling operations.

The Pressweld pneumatic placer used in pouring the east-portal wall was (Continued on page 61)



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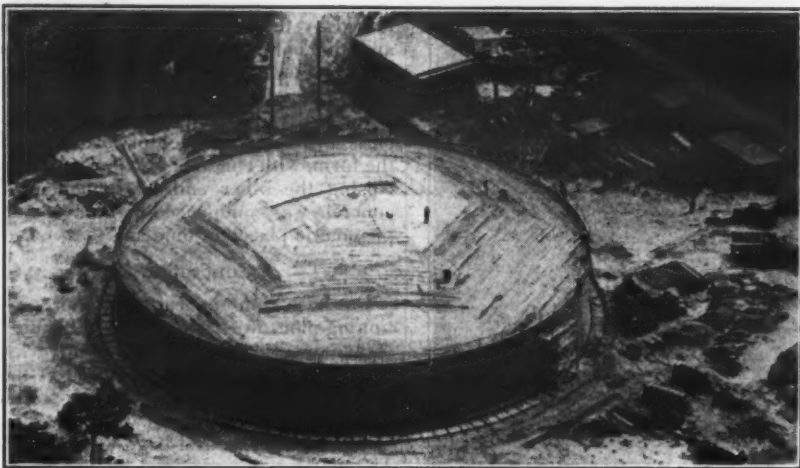
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Miami Herald Staff Photo

This new 2,500,000-gallon pre-stressed concrete reservoir is being completed, as part of the expansion of the Miami, Fla., municipal water system, by the Preload Corp. of New York City.

### Miami, Fla., Enlarges Water Works System

The municipal water works system at Miami, Fla., is being enlarged and extended under a general contract awarded to the Michael Leach Construction Co. of that city. The cost of the work is \$867,000, of which \$315,000 is an FWA grant for a war public works project.

Besides a 2,500,000-gallon storage reservoir, the contract includes a building to house a 4,000-gpm motor-driven pump at the reservoir, the installation of approximately 44,500 linear feet of 30 and 42-inch main from the Hialeah water plant to an existing main, to tie in with the present distribution system in the Miami Shores area, and construction of a 36-inch header connection at the Hialeah plant to permit interconnection of all service pumps with the new 42-inch main and three old mains.

In order to provide leak-proof storage for 2,500,000 gallons of water, a tank was built by the Preload Corp., of New York City, as a pre-stressed concrete structure. The walls and dome contain 670 cubic yards of Gunite, and the concrete floor and footings, 360 cubic yards. The total weight of pre-stressed banding wire in the walls and dome rings is 17

amount of standard reinforcing steel used on this job is 29 tons.

### Padded Steel Seats Made for Comfort

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This same company also produces cushion seats for trucks, scrapers, and other earth-moving equipment, insuring the maximum comfort for operators. These DeLuxe and Crusader seats are both comfortable and safe and are built up on a strong steel frame padded with high-grade resilient felt on the seat proper and the side walls. The DeLuxe seat is bucket-shaped while the Crusader has a removable cushion with high-grade

coil springs covered with genuine black leather.

Catalog sheets containing illustrations, specifications, and prices of these various types of seats for equipment may be secured direct from the manufacturer by mentioning this news item.

### Caterpillar Promotions

The advancement of eight men in the Parts Department of the Caterpillar Tractor Co., Peoria, Ill., has been announced. M. T. Deames, who has been associated with the company in various positions since 1929, now becomes Assistant General Parts Manager. In this position he will be assisted by A. H. Yingst for Export and Governmental Sales; T. H. Hodgins for the Central Sales Division; C. M. McKnight for the Western; and B. W. Kramm for the Eastern Sales Division.

E. L. Mason, H. F. Haven, and C. D. Byrnes have been appointed Assistant Parts Managers of the Central, Western, and Eastern Sales Divisions respectively.



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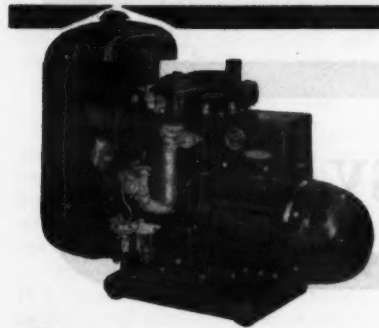
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## Barber-Greene Constant Flow Equipment





## Counties and Towns Seek State Aid in Pa.

Twin bills have been introduced in the Pennsylvania State Legislature seeking an appropriation of \$20,000,000 for emergency road-repair work for the political subdivisions of the state. The money would be allocated from the \$110,000,000 general-fund surplus and would be used specifically for repairs to

roads which are "necessary in connection with production of war materials and transportation of farm products".

The Allegheny County Citizens' Political Action Committee and the sponsors of the two bills said that the war effort would be greatly hampered "unless local communities can embark on a large-scale resurfacing program immediately" to repair the ravages of the winter's freezing and thawing of the roads.

## Penn-Dixie Appointments

Fred L. Doolittle has been made General Sales Manager of the Pennsylvania-Dixie Cement Corp., New York City, to succeed B. W. Druckenmiller who is now President of the corporation. Mr. Doolittle joined the company in 1929 as a clerk in the Boston Office. After serving as a salesman in the field for five years, he became Assistant District Sales Man-

ager in Boston and later was transferred to the New York Office to fill the position of Assistant Sales Manager. He will continue to make New York his headquarters in his new post.

Other Penn-Dixie appointments include L. L. Van Nest, Assistant General Sales Manager; Frank J. Selinger, Jr., Director of Dealer Relations; and Hugh R. Hamilton, Assistant to the General Sales Manager.



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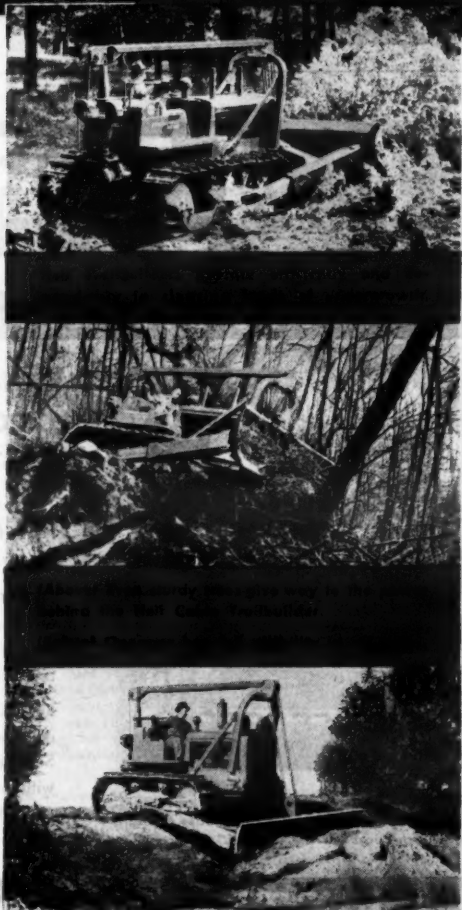
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## Senators to Create 100,000 Contractors

According to Senator James E. Murray of Montana, Chairman of the Senate Small Business Committee, more than 100,000 new small business enterprises will be needed in contract construction after the war if the construction industry is to provide its share of full employment for returning veterans and other workers. He stated further, "At the present time, only about 140,000 builders and contractors are engaged in contract construction work throughout the United States. There are, in fact, about 50,000 fewer such firms now operating in the industry than in 1933 at the bottom of the depression."

The volume of new construction has dropped from an all-time high of \$13,600,000,000, reached in 1942, to a level of approximately \$3,500,000,000 anticipated for 1945. As the volume dropped, small construction firms were forced out of business and their members and employees taken into the armed forces or

diverted to work in war industry.

Although the construction industry has, in the past, been characterized by a large turnover in the number of firms starting and going out of business each year, it is now serviced by too few firms to handle the large volume of work which must be started as soon as possible after the defeat of Germany and continued through the transition period to provide maximum employment.

Demobilized veterans and war workers should find considerable opportunity for reestablishing themselves in this industry if they have good experience. Veterans lacking capital when they return home will find that the G.I. Bill of Rights makes provisions for them to get loans that they can use to set themselves up in business. The Senate Small Business Committee is completing a preliminary survey of the basic problems of the construction industry and expects to commence hearings this month.

It is to be hoped that this admirable step on the part of the Senate Small Business Committee will be governed by

a procedure which will prevent the creation of a large group of irresponsible contractors without sufficient background to insure stability. A mere desire to enter the construction field is not an adequate guaranty of ability, honesty, and responsibility. If each new contracting business to be set up were required to obtain a certificate of experience for its principals from the Bureau of Contract Information, there would probably be fewer such loans, but the actual number of responsible contractors would be increased, much to the benefit of public and private construction.

### New Schramm Dealer

The Construction Equipment Corp., 5235 Madison Road, Cincinnati 27, Ohio, has been appointed distributor for the products of Schramm, Inc., West Chester, Pa. The new dealer will handle the complete Schramm line of portable and stationary compressors and tools, and will provide service facilities.

## New Officers Elected By AHONAS Directors

At the annual meeting of the Board of Directors of the Association of Highway Officials of the North Atlantic States, the Board accepted the report of the Nominating Committee and unanimously elected the officers for the coming year as follows:

President, Raymond B. Traver, Onondaga County Superintendent of Highways, Syracuse, N. Y.; Vice President, Ezra B. Whitman, Chairman, Maryland State Roads Commission, Baltimore, Md.; Secretary-Treasurer, A. Lee Grover, Secretary, New Jersey State Highway Department, Trenton, N. J.

The Directors' conference was attended by thirty-three directors and officials from member states, four representatives of the Public Roads Administration, including Commissioner Thomas H. MacDonald and Deputy Commissioner Herbert S. Fairbank, and two officials from the Province of Ontario, Canada.

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We are in the market for a strong, tough, moisture-proof, all-weather paper which will materially reduce our job costs . . . a paper which has proved itself "tops" as a concrete curing and protective agent . . . one that eliminates all doubt as to the curing results. It must be a scuff-proof paper, capable of standing plenty of abuse and protect against drippings and debris. It must be time-tested and generally accepted by engineers and architects. Address your replies to "Wide Awake Contractors," Anywhere, U.S.A.

### Here are a few of the Many Sisalkraft Uses

Cover and protect equipment against weather . . . cover stock piles . . . closing in . . . cover brick courses . . . lining construction shanties . . . cover sand cushion under terrazzo . . . over sub-fills . . . for all-around building protection.

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NEW YORK SAN FRANCISCO LONDON STONE

**SYNTRON**

"Pulsating Electromagnet"

## CONCRETE FORM VIBRATORS

with quick-acting vise clamp

## SAVE CONCRETE—

## SPEED UP PLACING AND SETTING

Applied to thin wall forms—pipe forms—as vibrating screeds—also for bolting to bins, hoppers and chutes to provide a fast, free flow of sand, cement, aggregate, etc.



3600 Vibrations per minute

No cams, bearings, eccentrics or other moving parts to wear out.

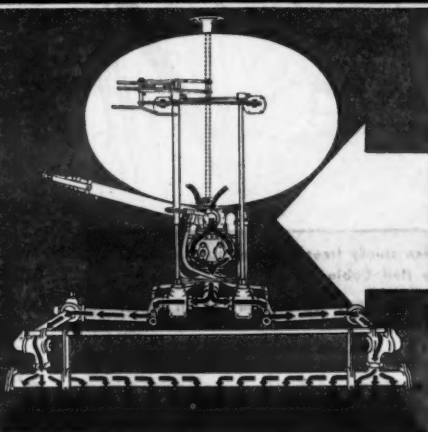
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## ETNYRE "Black-Topper" BITUMINOUS DISTRIBUTORS



### COMPACT CIRCULATING SYSTEM

Takes shortest line from tank to spray bar...

NO WASTE of heat or energy from long travel of hot or cold material.

LEAKPROOF... no pipe fittings. Service any part without disturbing remainder of system.

Less than 5 cubic feet required for entire circulating system, including pump. Handles all grades asphalt, tar, emulsion or road oil.

**E. D. ETNYRE & CO., Oregon, Illinois**



## Wayne County

(Continued from page 6)

building.

The center and west sections are given over to repairs of heavy equipment such as shovels, graders, cranes, pavers, finishing machines, and boilers. In the center of the room is an Elmes 75-ton hydraulic press flanked by two acetylene welding units, an Airco and a Weldit.

### Other Shops

In the southwest corner of the main building, enclosed by cinder-block walls, is a 25 x 60-foot blacksmith shop with two overhead fluorescent lights. Equipment here includes two 4-foot-square forges with anvils, a Nazel power hammer, an old Rockford drill, and an American drill.

North of the blacksmith shop are two similar shops, one of which contains the woodworking department and the other the welding and tin department. The woodworking department, besides its regular maintenance duties, constructs park and roadside picnic tables. It is equipped with a planer, a band saw, a combination cut-off saw and planer, a Porter wood-turning lathe, and a Moak saw. Regular equipment in the welding and tin department consists of a Weldit acetylene welder, a P&H-Hansen arc welder, and a Hobart arc welder.

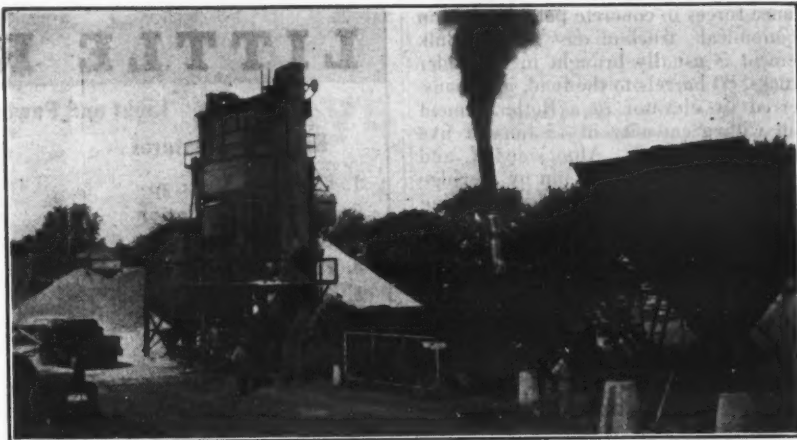
At the northern end of the main building a section is given over to the storage of oil drums. Here also is located a broom-making machine which supplies the rotary brooms used in the power-driven street sweepers.

### Boiler House

To the rear of the main building is a brick boiler house, 20 x 50 feet, built with a concrete floor and containing a 109-hp Kewanee boiler and an automatic stoker. Coal for the boiler is piled up outside the house. This heating unit furnishes steam for the other buildings in the maintenance plant which are equipped with Modine unit heaters. Also contained in the boiler house is a Chicago-Pneumatic 250-cubic-foot air compressor which supplies the entire plant.

### Paint and Sign Shop

Painting and sign-making operations are carried on in a 50 x 60-foot shop to the rear of the boiler house. Like the rest of the group, this building is brick with a concrete floor. Here metal road signs are repaired by straightening them on a steel table with heavy hammers. The old paint is removed by immersing them in a 10 x 10 x 3-foot stripper tank using a hot solution of Magnus as a scouring agent. The signs are then placed in a 10 x 14-foot spray booth where they are painted with enamel. The fumes from the paint are sucked out through a stack by a blower. The signs, which are suspended from a traveling bar, are next conducted into the baking oven which



C. & E. M. Photo

The 350-ton asphalt plant of Wayne County, located in the eastern section of the depot at Wayne, Mich.

consists of two banks of 260-watt infra-red bulbs, 51 lights to a side. After a baking by these 102 bulbs, a finish coat is added to the prime coat and the signs are baked as before.

Many of the road signs in Wayne County are made with Scotchlite fabric pasted on a wooden background with Scotchlite adhesive. It consists of minute beads of glass which have great reflect-

ing power at night under the glare of headlights. The County also puts Prismo beads on the painted center-line stripes for reflection. Some of the directional signs being made for superhighways in Wayne County are 12 feet long x 10 feet high, using 18-inch letters.

West of the paint and sign shop is a long narrow shed 220 x 22 feet which is used for machinery storage. To the east is a 57 x 17-foot loading dock where material can be unloaded from a railroad siding of the Michigan Central Railroad.

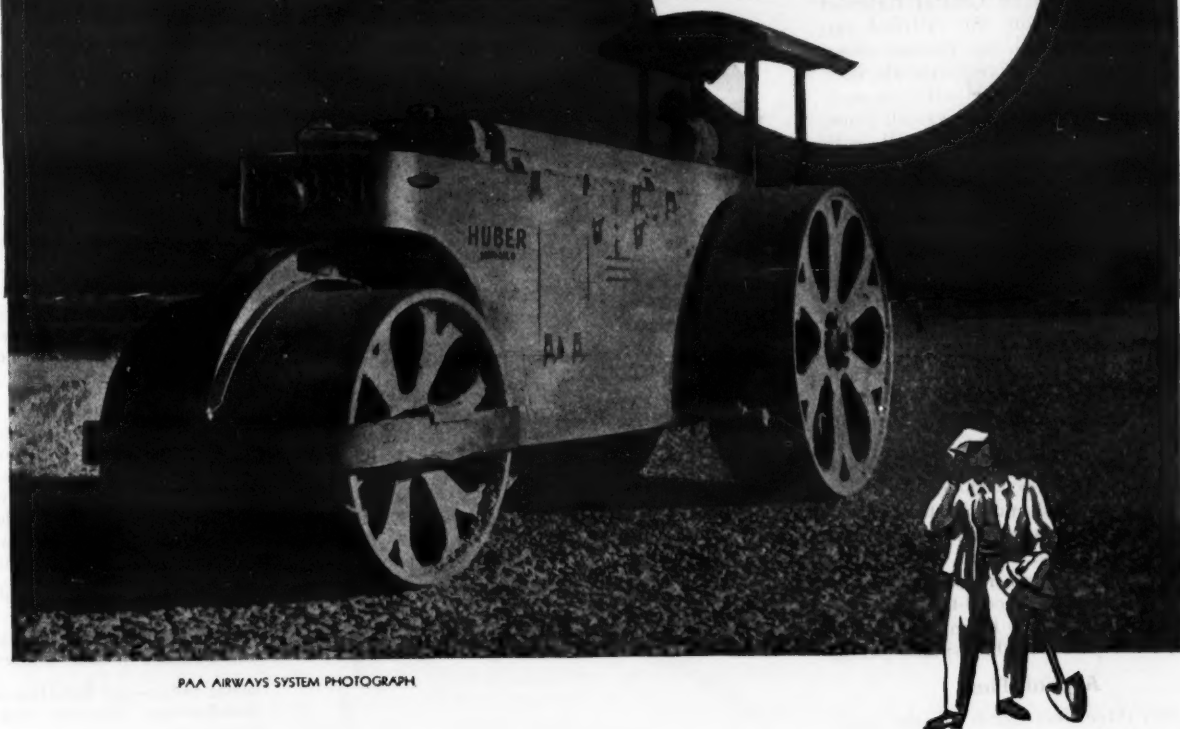
### Garages

East of the main building and bordering on Howe Road are two garage buildings of brick-wall steel-truss construction with concrete floors. The one to the south, which is 150 feet long with a 60-foot front on Howe Road, is used primarily for storage. Old oil from any unit is returned to this storage garage where it is reclaimed by Skinner Purifiers, which over a period of eight years

(Concluded on next page)

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PAA AIRWAYS SYSTEM PHOTOGRAPH

That's the story of many of the airfields at home and abroad via which men and materials are today reaching our far-flung fighting fronts. We're proud of the war-time job the new Huber Rollers have done and are doing, and you'll be just as favorably impressed with their performance when they're again available . . . soon, we hope . . . for peacetime construction assignments.

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# HUBER ROLLERS

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Have you a plan for a practical machine that will do some job better? One of our clients, a well-established Chicago construction equipment manufacturer is looking for new products to develop, manufacture and help you market through well organized construction distributor sales organization. Fully equipped to take your product while it is still in the "idea stage"—design, engineer and test it and then put it into immediate production. Factory located convenient to all supply and shipping facilities. Will do complete manufacturing for you on royalty basis or operate on a sub-contract—or what is your proposition?

Write today, giving rough outline of your ideas and appointment will be arranged for preliminary discussion.

**RUSSELL T. GRAY, Inc.**  
205 W. Wacker Drive  
Chicago 6, Illinois



## Wayne County

(Continued from preceding page)

has resulted in considerable savings. In the southeast corner of the building and to the left of the 14-foot entrance door is a metal spray booth used for painting cars and trucks. In the northwest corner is a 22 x 18-foot compartment for oil storage. The two garages are separated by a 30-foot-wide concrete roadway to Howe Road.

The garage to the north, which has an 80-foot front on Michigan Avenue and a 180-foot dimension along Howe Road, widens at the rear or south end to 120 feet for the final 65 feet of its length. This latter section has two 13-foot folding doors located opposite each other at the east and west sides of the building. Trucks are washed here with a stream from a high-pressure water pump.

The northern wing of this building has a stock room 85 x 30 feet, alongside of which is an auto-repair and machine shop which can be entered from the outside through a 12-foot overhead door in the west wall. Work benches equipped with small tools are placed against the west wall and this section is further equipped with a 25-ton and a 40-ton Manley press. The administration offices are located in the northern end of this building in an area 25 x 80 feet facing Michigan Avenue.

### The Yard

The 4.5-acre yard, enclosed by a woven-wire fence, lies across from the building units, with Howe Road on the west, Michigan Avenue on the north, open fields on the east, and the main line of the Michigan Central Railroad on the south. From the railroad two spurs enter the yard, one running down the center, on which raw materials, such as aggregate, are principally carried; and the other, parallel to the south fence, over which tank cars can roll with bituminous material. The yard is entered from Howe Road through two gates in the fence. At the right-hand side of the south gate, just inside the yard, is a 30 x 100-foot corrugated-metal shed used for storing cement, salt, calcium chloride, etc. To the east and lying alongside the fence is an area for lumber storage.

Between the south fence and the railroad spur which lies 40 feet north of the fence are located the tanks containing bituminous material for the asphalt plant. Here may be found a 3,600-gallon tank for fuel oil; two 4,000-gallon tanks, one containing T-3 and the other RC-2; a 5,000-gallon storage tank; a 16,000-gallon tank of MC-2; and a 9,000-gallon tank of AC-5. A small house adjacent to the tanks contains a coal-fueled steam boiler which heats the bituminous material and the jacket of the asphalt pump.

### Asphalt Plant

Thirty-three feet north of the spur track and opposite the tanks is a 60-ton Butler mechanical-charging bin into which a Link-Belt Speeder crane with a clamshell bucket loads aggregate for use in the asphalt plant. From the bin the aggregate moves in conveyor buckets to a cylindrical drier, 35 feet long x 4 feet in diameter, heated by a two-burner Gem fuel-oil torch. The drier is driven by an electric motor. After leaving the drier, the heated aggregate is raised to the cone-shaped revolving screens, while another elevator on the opposite side raises limestone dust from a Butler bin to the pugmill. The graded aggregate is delivered to bins and thence to an electrically driven Iroquois pugmill which has a capacity of 350 tons per day. Asphalt is delivered to the plant by an electrically driven pump.

### Concrete Batching

The yard also contains a concrete batching plant which is used by main-

nance forces in concrete patching within economical truck-mixer hauls. Bulk cement is usually brought in on trailer trucks, 80 barrels to the load, and transferred by elevator to a Butler cement bin with a capacity of 75 tons or five trailer-truck loads. Alongside of and connected to the cement bin by a bridge are Blaw-Knox aggregate bins holding sand and stone. Because of the connecting bridge, only one operator is necessary to manipulate all three controls on the cement, sand, and stone bins. Rex Moto-Mixers mounted on General Motors trucks deliver the concrete to the patching jobs.

### Personnel

Milford N. Brown is General Superintendent of the Wayne, Mich., shops of the Wayne County Road Commission, of which LeRoy C. Smith is County Highway Engineer and John K. Norton is Engineer of Highways.

*The Mighty Seventh War Loan Drive is on! Back it with War Bonds!*

### Light and Power for the Contractor

#### Superior Features

1. Constant Voltage
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Diesel and gasoline engine driven light and power plants 2 to 50 K.W. Floodlights and portable poles.

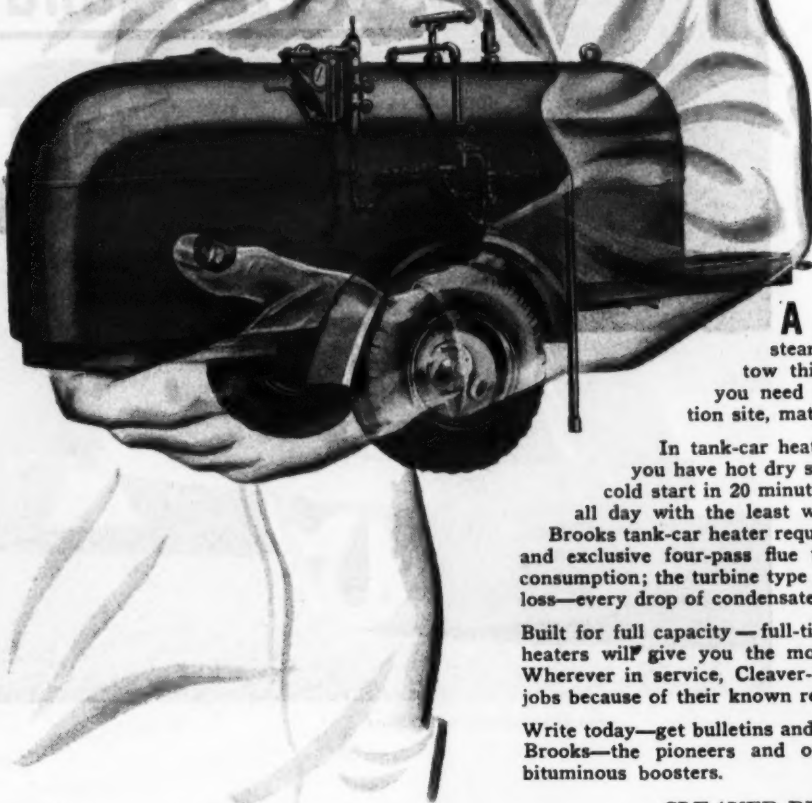
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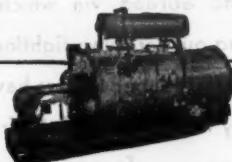
In tank-car heating with the Cleaver-Brooks heater you have hot dry steam flowing to the car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks tank-car heater requires less fuel and water. The famous and exclusive four-pass flue travel construction means low fuel consumption; the turbine type condensate return system cuts water loss—every drop of condensate goes back to heater under pressure.

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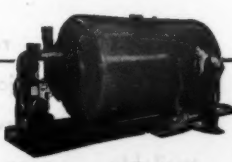
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Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes from 20 to 500 h.p.; pressures 15 to 200 lbs.



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Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.



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Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure—no water or heat loss. Provides a portable source of steam wherever needed.

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Pioneers and Originators of \*TANK CAR HEATERS \*BITUMINOUS BOOSTERS \*AUTOMATIC STEAM-PLANTS



# Building In Quality On Future Highways

## Narrow Rights-of-Way Have Given Way to Wider Takings And Complete Development For Safety, Economy, Beauty

By WILBUR H. SIMONSON, Public Roads Administration; Secretary, Coordinating Committee on Roadside Development of the Highway Research Board and the American Association of State Highway Officials

NEW highway models, like new automobile models, have great public appeal. A gracefully flowing alignment with streamlined shoulders, gutters, and side slopes gives an immediate "built-in" finished quality to new highway construction. Better roadways will give post-war construction a "more lasting look" and pay dividends in added safety and easier maintenance. If we visualize the coordination of roadbed construction and roadside development as the major task of post-war building, we are then thinking in terms of maximum economy and maximum efficiency for the whole highway structure.

### "Erosion-Proof" Construction

The operation and maintenance of state highway systems become most critical in seasons of blizzard and flood. Again this spring, the rain-swollen Ohio River rolled toward crests several feet over flood stages, bringing a sodden valley its highest water since the record flood of 1937. The demonstrated value of roadside development as an effective aid in protecting the public highway investment against serious flood damage was brought out for the first time in the official reports and estimates of road damage from the 1937 flood made by the Ohio Department of Highways.

This survey of road damage caused by the flood showed how unprotected surfaces of steep slopes were eroded by the high waters. Large sections of old highway were found inundated and, in some places, the old railroad type of roadway cross section gave way entirely and whole pavements were completely washed out.

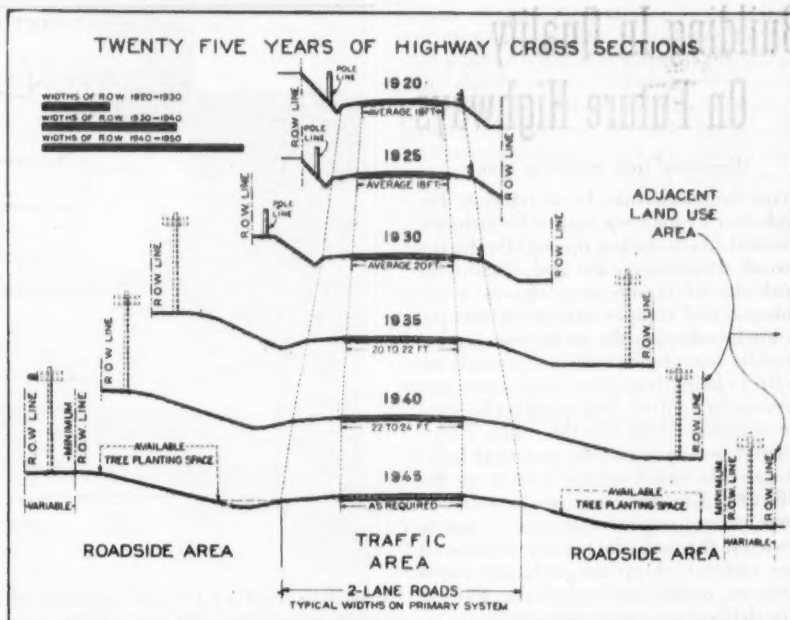
The report pointed out that newly completed sections of highway with flattened and rounded slopes protected

by ground cover were found generally to have resisted erosion surprisingly well, and were only slightly, if at all, damaged by the record flood. Only relatively incidental repairs were needed on the new streamlined sections with erosion-proofed slopes. Large appropriations for emergency flood relief were required, however, to cover the high cost of replacement and reconstruction on the older sections.

This critical test in Ohio proved the practical benefit of roadside development in controlling and preventing erosion and flood damage to highways.

In northern states, the control of snow drifting on pavements is another serious problem. The way North Dakota faced the task of keeping its roads in

(Continued on next page)



• They're right at home in water or mud, these husky Oliver "Cletrac" crawler tractors. The positive sealed construction of the lower track wheels keeps mud and water out . . . keeps oil in to protect against damage and wear. Each end of the bearing is fitted with a double dirt-oil seal, another Oliver "Cletrac" feature, that materially prolongs the life of the lower track wheels.

And, Oliver "Cletrac's" controlled differential steering is a big help when operating in mud or water, especially when the tractor is equipped with front-end loading equipment such as the Drott Bull Clam shown here. This exclusive principle means greater traction . . . less wear on steering

parts. Power is never disconnected from either track when turning, assuring a steady flow of pushing or pulling power plus greater safety on hills and turns.

Oliver "Cletrac" tractors are ruggedly built for long, dependable service. Drop forged and rolled steel construction eliminates excess dead weight . . . adds strength. Their unusual accessibility makes maintenance a simple task. Substantial numbers of Oliver "Cletracs" are now being released for essential service. Your Oliver "Cletrac" dealer will gladly assist you in making application for a new tractor. **The OLIVER Corporation**, Industrial Division, 19300 Euclid Avenue, Cleveland, Ohio.

## KINNEY BITUMINOUS DISTRIBUTORS

### Many Outstanding Features:

- Kinney jacketed rotating plunger pump
- Air or manual controls
- Efficient heating system
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# OLIVER - Cletrac









## Building In Quality On Future Highways

(Continued from preceding page)

for states, counties, and cities will thus appreciate the timeliness of combining paved and unpaved areas of construction into one complete operation. Vital problems of right-of-way development and erosion prevention now take on a new importance, and highway and landscape engineers and contractors need to take an active part in finding the most satisfactory solution in each complete improvement. Roadbed and roadside go side by side. Each is essential to complete the other.

### Better Roadsides — Better Service

Before the war, demonstration projects in every state had shown that better roadside design and development mean better traffic and driver services and substantial savings in highway maintenance costs. Ten years of operation of the one per cent Federal allotment for roadside demonstration purposes have proved conclusively that the groundwork of streamlined grading, adequate drainage, and positive prevention of erosion is indispensable for the protection of highways, for traffic safety, and for reduction of annual highway maintenance. Highway organizations should now be working out ways to improve old practices and develop new methods that can be put to use in the post-war highway construction program.

Roadside development should accomplish three basic purposes:

1. To streamline all earth grading.
2. To provide adequate drainage for the entire right-of-way and adjacent development.
3. To prevent erosion within, on, and off the highway right-of-way.

### Roadside Grading and Drainage

Earth grading should be warped and rounded into the existing ground so that no sharp edges or angles remain at the crests or toes of slopes. Liberally rounded slopes present a pleasing appearance and resist erosion. Most earth cuts and fills can be readily moulded into streamlined smoothness with the new types of excavating equipment. The most natural grading by the operator's "eye" will be gradual and graceful in the shaping of shoulders, gutters, and side slopes except where tight topography or the preservation of existing trees may call for special adjustment or treatment.

Surface and subsurface drainage of shoulders should get special attention. Stabilized shoulders of modified construction for a stabilized "soil-turf" treatment should have adequate cross



slopes to carry the water away from the pavement as quickly as possible to the side gutters. Drainage ditches with steep sides should be avoided and, where possible, shallow rounded drainage ways or gutters used instead. Suitable outfalls of adequate drainage capacity should be provided at the ends of cut slopes, and of pipes, culverts, and bridge drains.

Excessive damage is caused by storm run-off each year on projects in every state. Inadequate drainage and slope protection result in erosion, siltation, clogging of culverts and ditches, sloughing and sliding of slopes and fences, softening of shoulders, and the undermining of guard rails and pavements.

### Protection of Unpaved Areas

The new way to handle slopes is the easy and natural way for improved mobile types of grading equipment. "Sand-paperying" of slopes is eliminated and hours of precious time and labor conserved. Prompt placing of mulch or other "erosion-proof" slope treatment (Concluded on next page)

## GAR WOOD EQUIPMENT

# FIGHTING ON EVERY FRONT



Somewhere off in the far Pacific ... on the hard fought battlefields of Europe ... in Asia ... Africa ... everywhere, you name it ... that's where Gar Wood equipment is serving Allied Forces in a hundred different ways. Forced Bulldozers with a colorful history, earth-moving Scrapers, Winches, Winches, Winches, Hi-Lift Plane Loaders, Hydraulic Hoists, Dump Bodies, gasoline, oil and water Truck Tanks ... these and many others are the wartime products of Gar Wood. Each of the six divisions of Gar Wood Industries, Inc. specializes in its field, and each division is busy producing the fighting equipment it knows best how to build.

When Victory has been won, Gar Wood Equipment will again be available for civilian use. All the experience accumulated in years of peacetime will be combined with new wartime developments to bring you better-than-ever Gar Wood Equipment.

Support the 7th War Loan Drive  
BUY MORE BONDS



## GAR WOOD INDUSTRIES, INC.

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WORLD'S LARGEST MANUFACTURER OF TRUCK AND TRAILER EQUIPMENT

HOISTS AND BODIES • WINCHES AND CRANES • TANKS • ROAD MACHINERY • HEATING EQUIPMENT • MOTOR BOATS

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Special Equipment  
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Write for descriptive catalogs.

McKIERNAN-TERRY CORP.  
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New tent sites have constantly been built as the Marine Corps' Camp Joseph Pendleton in California expanded. Here, an International tractor and bulldozer bring in fill for one of these sites.

### Building In Quality On Future Highways

(Continued from preceding page)

before the soil surfaces have become dried and baked, or washed and gullied, protects the new earth grade from raveling. By careful "follow-through" in streamlined grading, drainage, and slope-protection operations, the contractor can largely avoid any need for re-finishing and redressing of washes and gullies on graded shoulders, gutters, and side slopes. This speeds up final inspection and full payment. The time and money thus saved can be devoted to getting the whole job done faster, and the public can better enjoy full use of the completed construction.

#### Begin With Better Plans

Streamlined roadsides are the key to "built-in" highway safety, good appearance, and easy and economical maintenance. New highway building begins from the ground up. It takes more than a piece of pavement to make a post-war highway. Unless new pavements are placed in a complete right-of-way development, the strongest of pavements is left unprotected and, like building a house on a sand foundation, the new highway construction is likely to fall short of its purpose. Real rebuilding of a more streamlined American highway system begins on a firm foundation of practical roadside development.

In conclusion, it should be pointed out that we have dealt here with basic roadside operations essential to every highway and of value to every contractor doing highway work. Now is the time to get the basic provisions for complete right-of-way development and erosion prevention into the plans, specifications, and estimates in order to have them ready for application to all highway construction in the anticipated era of program expansion. Better roadsides begin with better plans.

Illustrations, courtesy of Public Roads Administration

#### Three ARBA Bulletins

The American Road Builders' Association is continuing the publication of its series of bulletins by printing the papers presented at its Forty-Second Annual Meeting held in Chicago in January. The three current bulletins, which may be secured by writing to the Association at International Building, Washington 4, D. C., are:

"The War and the Army Engineers" by Major General Eugene Reybold, Chief of Engineers, U. S. Army; "The Seabees in the Pacific" by Captain H. W. Johnson (CEC) USN, Bureau of Yards and Docks, Navy Department; "The Status of Public Works Planning" by Major General Philip B. Fleming, Administrator, Federal Works Agency. These bulletins are numbered 85, 86, and 87, respectively.

### Compilation, History Of Conn. Road Finance

A statistical compilation, "Connecticut Highway Facts," covering the history of highway financing in Connecticut and enumerating highway receipts and disbursements during the decade 1934-43, has recently been issued by the National Highway Users Conference. This is one of a series of such compilations to be issued for each of the forty-eight states and the District of Columbia.

The compilation reveals that Connecticut highway financial receipts in 1934-43 aggregated \$216,956,000, while disbursements, including the cost of collecting and administering the motor-vehicle taxes, totaled \$206,221,000. Cash on hand in the highway fund on December 31, 1943, amounted to \$11,069,000, compared with the \$335,000 balance on January 1, 1934. This betterment in cash position during a 10-year period while a highway improvement program was in progress was achieved in part

with a fuel tax rate of 3 cents a gallon unchanged since October 1, 1935.

Copies of "Connecticut Highway Facts" and of the succeeding compila-

tions may be secured by those interested from the National Highway Users Conference, National Press Bldg., Washington 4, D. C. Price: \$1.00 each.

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## How RPM DELO Oil reduces engine wear



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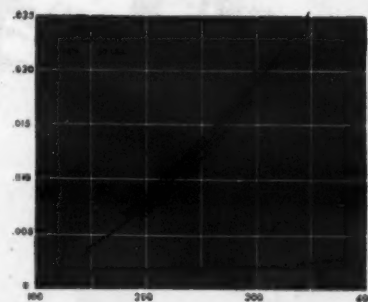


SCRATCHING WITH UNCOMPOUNDED MINERAL OIL

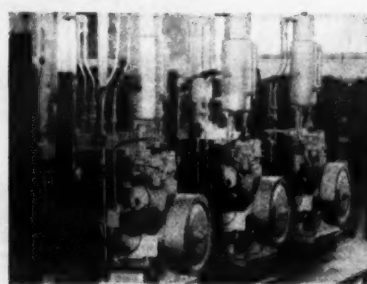


RING USED WITH RPM DELO OIL

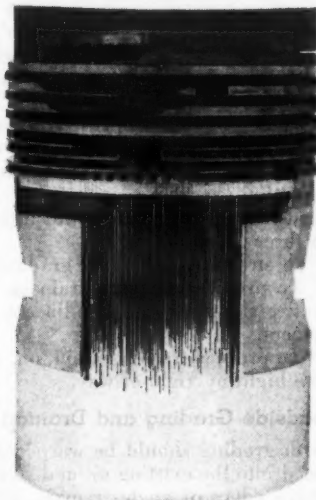
The actual photographs above, in which the lines are merely emphasized by printing in red, are typical of the results obtained when testing RPM DELO Diesel Engine Lubricating Oil against ordinary Diesel oils. Because RPM DELO Oil contains a patented metal-adhering compound, it clings to hot cylinder spots that other oils leave dry, protecting rings and liners against excessive wear.



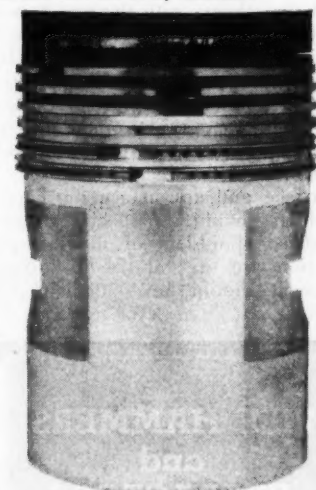
Confirming actual tests in engines are such laboratory tests as this with a Kinetic Oiliness Testing machine. RPM DELO Oil has far lower wear rate than the best un compounded oil.



Here is a battery of special test engines in California Research Corporation's laboratories. They are used to determine the anti-ring-sticking properties of oils.



Here is a piston used in a special break-in test with straight mineral oil. This actual photo, with scratches emphasized in red, shows how rings, lands and skirt are badly scratched.



This piston went through the same test as the one above—but with RPM DELO Oil. No scratching occurred and every ring is free. RPM DELO Oil's film prevents scratching and scoring.



+



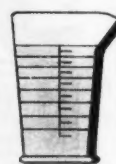
Detergent compound to clean engine.

+



Anti-oxidant to prevent gum and sludge.

+



Wear-reducing compound.

=



### STANDARD OF CALIFORNIA

RPM DELO Oil has world-wide distribution, marketed under following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, Imperial RPM DELO (CONCENTRATE)

For more technical information about this revolutionary Diesel Engine lubricating oil, write to Standard of California, 225 Bush St., San Francisco 20, California, or California Commercial Co., 33 Rockefeller Plaza, New York 20, N. Y.



# Airport Enlarged At Niagara Falls

**Creek Diverted as Army Builds Mile-Long Concrete Runway; Taxiways Added; Present Runways Extended**

THE Niagara Falls, N. Y., Municipal Airport was recently enlarged by constructing a new concrete runway 150 feet wide x 5,500 feet long; extending two existing runways 1,040 and 670 feet respectively; and adding 6,051 feet of concrete taxiways. To make room for these improvements, and to provide a more adequate channel for flood stages, Cayuga Creek had to be diverted from its former path which cut across the airport from the northeast to the southwest corner. A new channel has been dug along the northerly and westerly boundaries of the airport through which the water now flows on its way to join the Niagara River. The contract for this work was awarded to the Dutcher Construction Co. and John B. Schultz Contracting Co. of Buffalo, N.Y., by the U. S. Engineers.

This former civil airport, built in 1926 and located on U. S. 62, the main highway between Buffalo and Niagara Falls, was taken over by the Army after the war started and all civilian air traffic ceased. The airfield is now used primarily for testing planes manufactured for the Army Air Forces by the Bell Aircraft Co. whose huge factories are located there.

Niagara Falls Airport, at Elev. 570, is rectangular in shape, being about 1½ miles long in an east-west direction and 1 mile wide from north to south. The soil is reddish-brown clay with some heavy rock outcrops in the northwest corner of the field. Before the present improvements, the airport had an east-west bituminous-macadam runway about 4,000 feet long near the south end of the field, from the center of which two other macadam runways fanned out at 45-degree angles to the northwest and northeast. At right angles to the main runway was a north-south macadam runway. These last three runways were about 3,500 feet long.

## Cayuga Creek

Before any extensive improvements could be made, it was obvious that the water of Cayuga Creek would have to

be diverted from its path across the airport. The creek had been carried both in open ditches alongside the other runways and in culverts underneath the main east-west runways. The new plan called for a channel to intercept this creek before it entered the field at the northeast corner, and conduct it westerly along the northern boundary and then southerly along the western boundary where it resumed its former course to the Niagara River. Thus all the water that formerly entered the airport from the outside now flows through this 10,000-foot channel, the center line of which is located 350 feet from the edge of the new runway.

Following clearing and grubbing the line of the new creek channel, a Bucyrus-Erie ripper was used to break up compacted soil, while the rock sections were blasted. A Chicago Pneumatic and a Worthington compressor furnished the air for drilling. The width of the bottom of the ditch is 30 feet and the depth varies from 7 to 17 feet. In the earth sections the slopes are 1 on 2, while in

the rock the slopes are 4 on 1. The width of the ditch at the surface varies, depending on the depth of cut. Excavation for the channel totaled 170,000 cubic yards. Some of the earth-moving equipment used included a Lima 101 shovel with a 1¼-yard bucket, a Northwest 105, a Thew-Lorain, an Osgood with a 7/8-yard bucket, four Euclids for hauling the excavation away, a Bucyrus-Erie scraper pulled by an International tractor, a Heil scraper, four LeTourneau Carryall scrapers, three Tournapulls, two Caterpillar D7 tractors and three D8's, a Cietrac 90 tractor, two International TD-9 tractors and one International TD-14 tractor, and two Allis-Chalmers tractors with bulldozers.

The old Cayuga Creek channel now provides an outfall for interior field drainage. The upper 1,400 feet of this channel has been enclosed in a 60-inch reinforced-concrete pipe. A Lorain 40 crane with a clamshell bucket dug a trench between 7 and 9 feet deep for this pipe. The storm-water drainage from the creek was impounded temporarily in



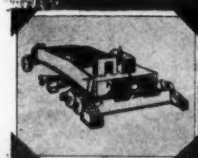
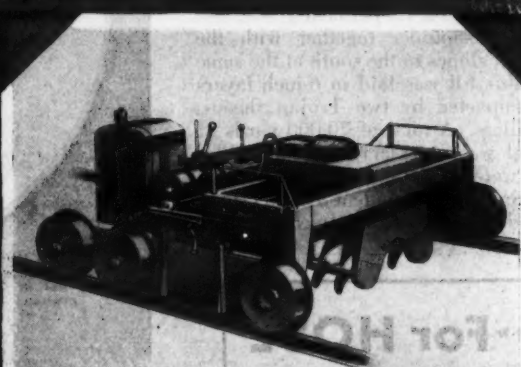
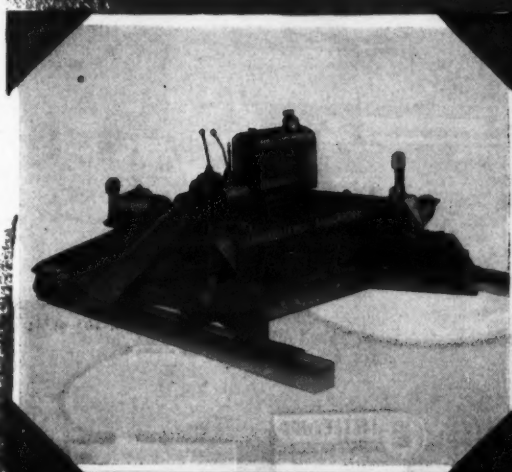
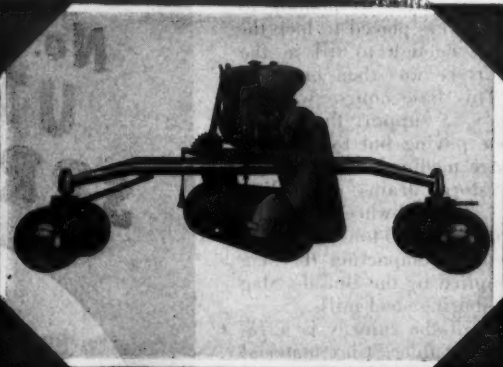
C. & E. M. Photo

A Lorain 40 crane with clamshell dug the trench for 60-inch reinforced-concrete pipe to carry field drainage at the Niagara Falls, N. Y., Airport.

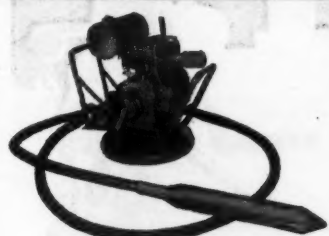
the reservoir at a low spot in the field  
(Continued on next page)

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## Niagara Airport

(Continued from preceding page)

until the large pipe could be laid and put into use. Material both from channel and ditch excavation was wasted on low ground along the west side of the airport. A Caterpillar power grader spread the material, which was later covered with topsoil and seeded.

### The New Runway

Because of the prevailing winds, the new runway was built due east-west. Using the varied earth-moving equipment on the job, the contractor excavated the 5,500-foot length of runway for its 150-foot width to the designated grade. The subgrade was shaped by an Austin-Western and two Adams power graders. A 3-inch layer of slag screenings was then placed on top of the clay sub-base. This screening course is dense enough to prevent the clay sub-base from working up into the porous base which was placed on top of the screenings and which consisted of a 12-inch layer of compacted run-of-mill slag from  $\frac{1}{2}$  to 4 inches in size. On top of this course just enough screenings, 60 pounds to the square yard, were placed to lock the surface but not enough to fill in the voids. The surface was then broomed and rolled. This base course was designed not only to support the weight of the concrete paving but to act as a porous drainage medium in conducting water to the storm drains paralleling the runway. Two 3-wheel Buffalo-Springfield rollers, a 10-ton and a 12-ton, were used in compacting the slag which was supplied by the Buffalo Slag Co. from neighboring steel mills.

On each side of the runway is a 75-foot compacted shoulder. Clay material from the runway excavation was used for the shoulders which are approximately 15 inches thick at the runways but feather out to meet the grade. The north shoulder of the new runway slopes to the north on a 1.5 per cent grade, and the south shoulder together with the pavement slopes to the south at the same rate. This fill was laid in 6-inch layers and compacted by two Trojan sheep-foot rollers. A total of 70,000 yards of material was necessary. Two sprinkler trucks were used to keep the fill at its optimum moisture content as a dry summer and prevailing westerly winds made



C. & E. M. Photo

Concrete for the new runway at the Niagara Falls, N. Y., Airport was delivered by pairs of truck mixers.

the clay very dry and difficult to compact. Fifteen 10-ton trucks were used for hauling the slag and material for the shoulders. As a final operation, the shoulders were topsoiled and seeded.

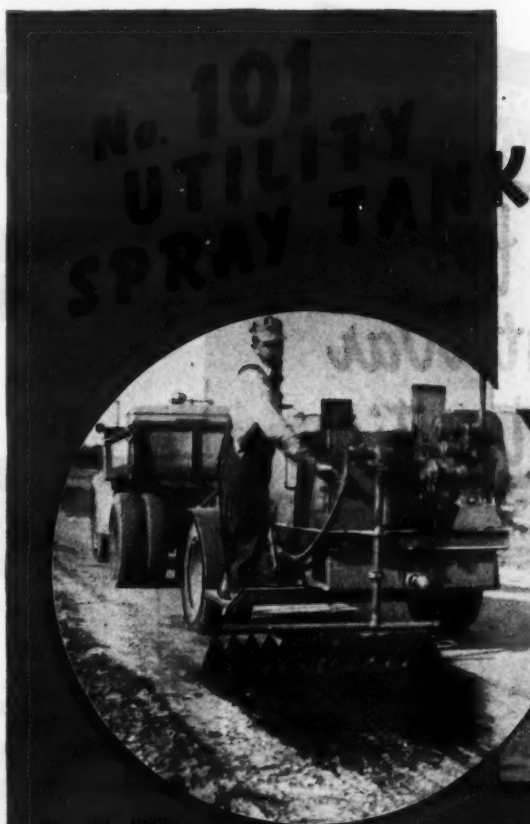
### Concrete Paving

The fine grade for the concrete paving was prepared by an Adams 50 power grader and a Buffalo-Springfield 3-wheel 10-ton roller. The pavement is  $10\frac{1}{2}$ -

7- $10\frac{1}{2}$ -7- $10\frac{1}{2}$ -inch thickness except at 300 feet from each end of the runway where it is increased to 12-8-12-8-12-inch thickness. This means that the pavement is 12 inches thick at the edges, tapers to 8 inches in 12 feet 6 inches, remains 8 inches for 50 feet and then increases to 12 inches again at the center line. The other half pavement section is symmetrical.

A C. S. Johnson batching plant was set up at one end of the airport by Cooney Brothers, Inc., of Tarrytown, N. Y., who had a subcontract to supply and deliver the concrete to the forms. A Northwest 1-yard crane was used to handle the aggregate at the plant. Bulk cement was delivered by truck from Buffalo. Sand was furnished by the Empire Builders Supply Co. of Niagara Falls which obtains its sand by dredging in Lake Erie. The coarse aggregate was slag, 40 per cent of which was graded  $\frac{1}{2}$  to 2 inches while the remaining 60 per cent was graded  $\frac{1}{4}$  to  $\frac{1}{2}$  inch, and was furnished by the Buffalo Slag Co. The

(Continued on page 76)

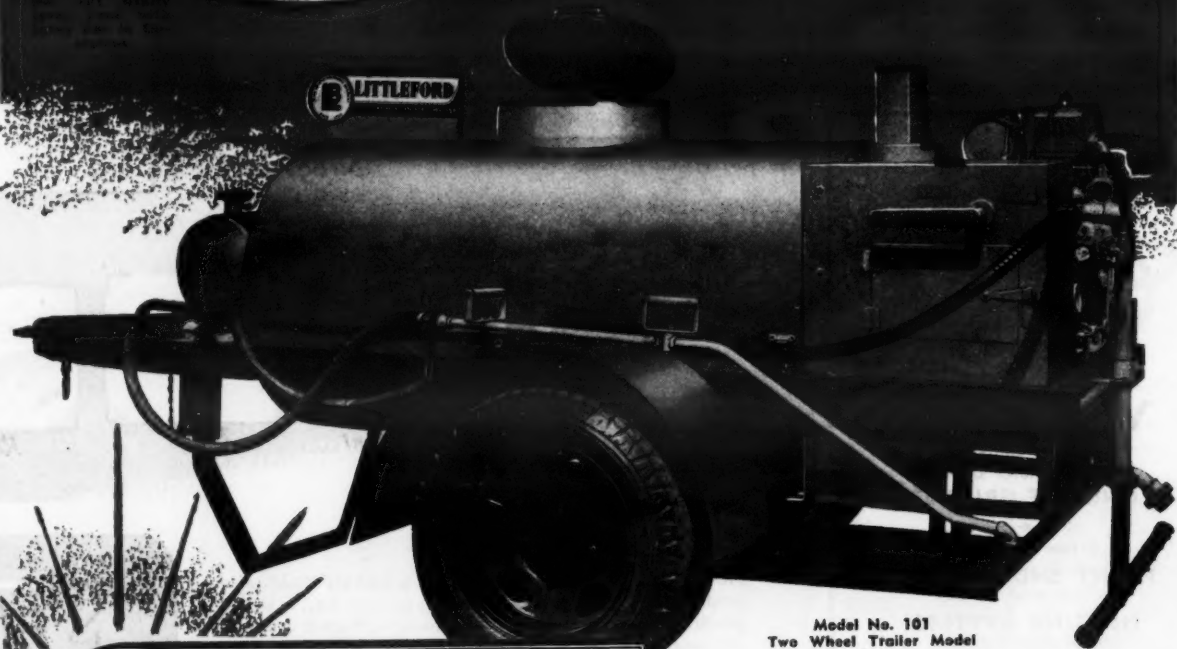


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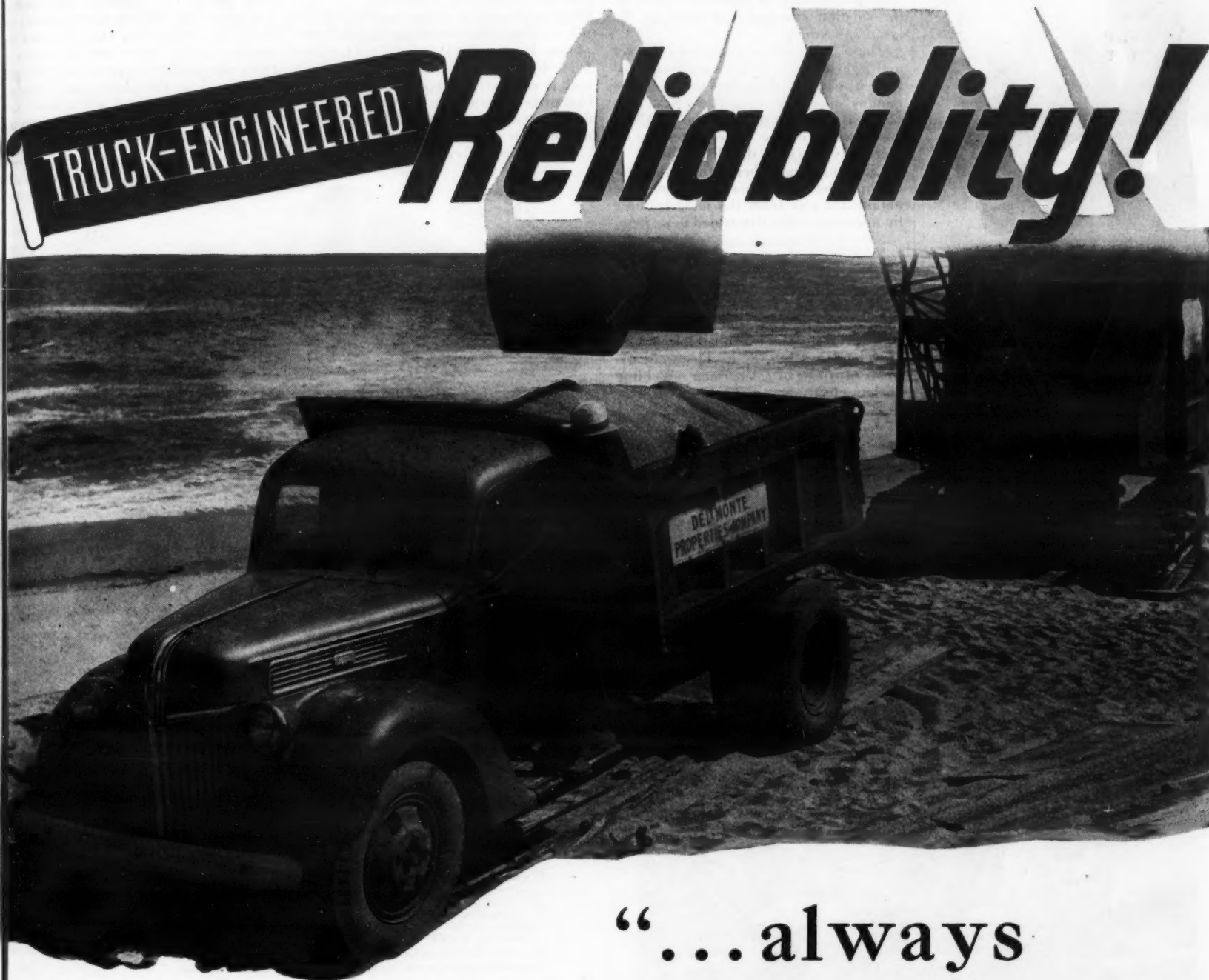
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One of the new Marvel hoists.

### Self-Powered Hoist Is Portable, Compact

Four sizes of a new handy portable hoist powered by 1½, 2, 3, and 5-hp Briggs & Stratton and Wisconsin air-cooled gasoline engines have been an-

nounced by Marvel Equipment Mfrs., Inc., 224 S. Michigan Ave., Chicago 4, Ill. All models are designed to use ¼-inch manila rope or plow-steel cable on the smallest size and 5/16-inch on the larger machines.

These hoists are rugged, yet compact and light enough to be loaded and unloaded without difficulty and can be handled like a barrel or bag truck. Provision is made so they can be weighted down when in use. The clutch is an especially designed dry-disk type.

Literature and other information regarding these portable hoists may be obtained direct from the manufacturer by mentioning this illustrated news item.

### New High-Speed Electrode

A new shielded-arc electrode with low spatter loss, easy slag removal, and very good re-striking characteristics has been announced by The Lincoln Electric Co., Cleveland 1, Ohio, as its Fleetweld 47. It conforms to American Welding Society electrode specifications Class E-

6012 and E-6013 and may be used with either alternating or direct current.

This electrode is specially suited for making high-speed horizontal or flat fillet welds over 4 inches long in which the coating can be dragged on both plates. It is available in 5/32 x 14, 3/16 x 14, ¼ x 18, and 5/16 x 18-inch sizes and is packed in 50-pound containers. Complete information may be secured direct from the manufacturer by mentioning this news item.

### Athey President Dies

C. Kier Davis, President of the Athey Truss Wheel Co., Chicago, Ill., died as a result of an automobile accident on March 7, 1945. Mr. Davis joined the company as Secretary and Treasurer in 1936, was made a director in 1937, and had served as President since October, 1940. He is survived by a son, Col. Leonard K. Davis, now serving with the U. S. Marine Corps.



### TAKE A *Load's-Eye* VIEW OF A BLACKHAWK JACK!

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## BLACKHAWK



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Spring loaded bucket scraper scoops out sticky material. Cleaned-out buckets take bigger bites.

Clean trencher buckets take bigger bites. On the Parsons 250 Trenchliner each bucket that bites into the trench is clean. Spring loaded bucket scraper (see picture below) cleans out sticky materials as bucket load is dumped, leaves each bucket empty. Gumbo clay can't stick, can't cut down trenching efficiency. Here are more reasons why the bucket line on the Parsons 250 Trenchliner can dig more trench per day: 1. Light weight, high strength digging buckets have wear resisting cutting lips. 2. Bucket teeth are forged of abrasion-resistant alloy steel. 3. Same teeth are used for both bucket and side-cutters. 4. Excavator chain links are heat hardened. 5. Connecting pins are self-locking, have no cotters.

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# Black-Top Surface For Michigan Road

**Bituminous Plant-Mix  
Tops Old Surface-Treated  
Gravel Road; Contractor  
Uses Own Asphalt Plant**

A PARTICULARLY rough 2-mile stretch of old gravel road between Richland and Yorkville, in the southwestern part of Michigan, which had been surface-treated in 1920, was recently resurfaced. The 18-foot pavement, part of State Route 89, first received a bituminous prime coat which was followed by a one-course bituminous-aggregate plant-mix varying in thickness from 1/2 inch to 4 inches, depending on the irregularities which were being erased in the old pavement. The job was done by the Globe Construction Co. of Kalamazoo, Mich., under a contract with the Michigan State Highway Department on a unit-cost basis for the number of gallons of prime coat applied, and the number of tons of bituminous material laid, at a total cost of around \$8,000.

## Laying New Surface

A prime coat of 0.1 gallon of MC-1 asphalt per square yard was applied by a Littleford pressure distributor of 1,050-gallon capacity mounted on an International truck. As traffic had to be maintained, a 10-foot strip was done the length of the job, followed by the 8-foot strip, using 10 and 8-foot spray bars, respectively. The prime coat was run out from 500 to 1,000 feet ahead of a Barber-Greene Tamping-Leveling-Finisher, the distributor stopping at the end of its run to block traffic off the freshly applied prime coat.

The bituminous-aggregate plant-mix, which was laid immediately after the prime was applied, was hauled 15 miles from the contractor's asphalt plant at Portage south of Kalamazoo in eight rented trucks, each capable of holding six batches of 1 ton each. The mix is called a bituminous-aggregate because it employs a liquid asphalt instead of the asphalt cement used in bituminous concrete. A typical 1-ton batch contained:

Limestone dust	105 lbs.
Sand, passing No. 8 sieve	750 lbs.
Stone, passing 3/4-inch screen	1,065 lbs.
Asphalt (MC-5, viscosity 300-600 at 82.2 degrees C.)	80 lbs.
<b>Total</b>	<b>2,000 lbs.</b>

The limestone dust, or mineral filler, must pass a No. 40 sieve 100 per cent, and not less than 75 per cent must pass a No. 200 sieve. The aggregate came from a gravel pit which was deficient in sand, so sand was added at times to make it conform to the following gradation:

Square Sieve Opening	Per Cent Passing
3/4-inch	100
3/8-inch	60-80
No. 10	40-50
No. 40	15-30
No. 200	0-5

A 3/4-inch crown was put on the road by adjusting the screed on the Barber-Greene finisher which laid from 235 to 415 tons a day. As the thickness of the course varied with the irregularities in the old pavement, the screed on the finisher had to be carefully watched and regulated so that these waves would not



C. & E. M. Photo

The Pioneer portable crushing plant of E. F. Brady, located near the asphalt plant, supplied the gravel for the bituminous-aggregate mix on the Globe Construction Co. contract on Michigan 89.

be carried over into the new surface. The plant-mix was compacted by a Buffalo-Springfield 8-ton tandem steam roller.

Additional equipment included a 1 1/2-ton Chevrolet utility truck which carried a 500-gallon water tank with a 1-inch pump to service the finisher and the boiler on the roller. Eight men were employed in the road crew, one acting as foreman, two on the pressure distributor who also doubled as flagmen, one operator for the finisher, one roller man, and

three rakers and shovelers. Immediately after rolling, the road was opened to traffic.

## Asphalt Plant

Both the bituminous prime coat and the plant-mix came from the contractor's own asphalt plant at Portage, where a 1-ton mixer is mounted on a railroad asphalt plant located on a siding of the Pennsylvania railroad. Of rather ancient

(Concluded on next page)



## TILL THE JAPS SAY "UNCLE"

AMERICA bounced back hard in this war against the Japs, and the boys who led the rebound were *United States Marines*.

Ever since Guadalcanal the Marines have proved that boys from Kokomo, the Ozarks and the Bronx—when steeped in Marine Tradition, skilled with Marine training—are doggone good fighters. On beachhead after beachhead—then in jungle after jungle—they were far outnumbered by the Japs. But not outfought!

On they go, those Marines, on land and sea and in the air...outsmarting, outshooting, outkilling the enemy—till the Japs say "Uncle."

They have good equipment, sure. Most of the thousands of trucks they use, for example, are

Internationals. And most of the thousands of bulldozing tractors they use are Internationals, too. Trucks and tractors—vital weapons in this grim, modern war!

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We proudly salute those boys from Kokomo, the Ozarks and the Bronx, who are fighting up to their glorious motto—Semper Fidelis.

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## WHERE THE MARINES FOUGHT

From Guadalcanal the Marines started marching in giant strides toward Tokyo—sweeping clean the stepping stones to Victory.

The Russell Islands, Segi Point, Viru Harbor, Rendova, Vangunu, Rice Anchorage, Enogai Point, Munda, Vella Lavella, Choiseul, Empress Augusta Bay.

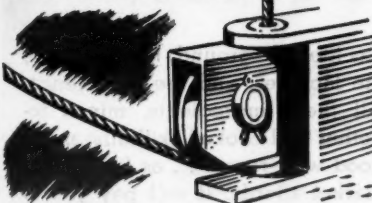
On to Tarawa, the island that the Japs said couldn't be taken.

Cape Gloucester. Then Majuro, first pre-war Jap territory to fall to U. S. fighters. Roi, Namur, and other islands in the Kwajalein atoll.

Eniwetok atoll. The Marianas—Saipan, Guam, Tinian. Peleliu, in the Palau Islands. And Iwo.

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SIX SIZES—3/8", 1/2", 9/16", 5/8", 3/4" and 7/8".

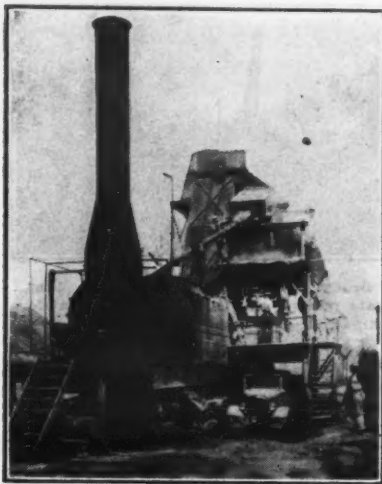
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C. & E. M. Photo  
The Globe Construction Co.'s 1-ton railroad asphalt plant at Portage, Mich., 15 miles from the job, produced the bituminous aggregate mix for its resurfacing contract between Richland and Yorkville, on Michigan 89.

## Black-Top Surface For Michigan Road

(Continued from preceding page)

vintage, this plant formerly dried the aggregate by heating it in a brick-in chamber fired by coal burning in a fire box below. In a similar manner the bituminous material was also brought to a liquid state. The wooden barrels containing asphalt were placed in huge kettles and heated by this external coal fire until the asphalt was liquefied.

For the past ten years, fuel-oil heat has been used for the drier but up to four years ago, the burners were in the chamber for coal heat. At that time, the plant was converted from external to internal-type drier.

The plant has ample facilities for storing the MC-5 asphalt which was transported from the Great Lakes Asphalt Co. plant in Chicago in railroad tank cars a distance of about 140 miles. The asphalt in the tank cars was heated to a temperature of 175 degrees F with steam from the main boiler in the plant, a Scotch marine 75-hp unit 12 feet long and 82 inches in diameter which also supplies the steam for the drier burners. This main boiler, incidentally, which operates on fuel oil must be started by an auxiliary boiler, 9 feet long x 4 feet in diameter, fired by coal which supplies the necessary steam to start the oil burners of the main boiler. A Blackmer 2-inch steam pump operating off the main boiler is used both for pumping the asphalt from the tank cars into the storage tanks, and later to send it through a continuous loop to the pugmill. One storage tank for the MC-5 is of concrete construction, built underground 36 feet long x 10 feet wide x 10 feet deep, and holds 80,000 gallons or the capacity of two tank cars. The other tank, of similar capacity, is made of metal and is 20 feet high with a diameter of 16 feet. Fuel oil is kept in a 10-foot-high x 10-foot-diameter steel tank with a capacity of 4,000 gallons.

The limestone dust came in 80-pound sacks and was stored under tarpaulins. The aggregate was hauled from a gravel pit just across the road from the asphalt plant in three Ford trucks of 6-ton capacity. A Michigan truck crane with a 3½-yard clamshell bucket was used to stockpile the aggregate which was loaded into the aggregate bins as needed by a P&H Model 400 crane using a ¾-yard clamshell bucket. From the bin hoppers the aggregate was delivered by bucket conveyor to a Cummmer drier, 24 feet long x 4 feet in diameter, which is driven by a 75-hp Westinghouse motor and heated by two fuel-oil torches.

The material then was conveyed by a bucket elevator to two 3 x 6-foot Simplicity vibrating screens, a ¾-inch size for the stone and 1/8-inch size for the

sand. The oversize material was piled up outside. The aggregate was admitted to the 1-ton-capacity pugmill at a temperature of not over 250 degrees F by manually operated levers and was mixed for 10 seconds, after which the MC-5 was added and mixing continued for an additional 35 seconds. The contents of the pugmill was then emptied by steam-ram controls into the waiting trucks below. The temperature of the mix when it was laid on the road was between 150 and 175 degrees F. Twelve men are employed at the plant which can produce 450 tons of bituminous mix a day.

### Aggregate Supply

The gravel aggregate for use in the mix on this 2-mile contract was produced by E. P. Brady of Flint, Mich., who set up a Pioneer No. 48-V Duplex portable crushing plant powered by a Caterpillar 160-hp diesel engine mounted on a trailer in a gravel pit close by the asphalt plant. This plant has a jaw crusher with a 10-inch opening 36 inches wide and a roll crusher 40 inches in diameter

and 22 inches wide for secondary reduction. Only a ¾-inch top screen was used, as the sand was later screened out at the asphalt plant.

A Northwest 1-yard dragline fed the hopper of the crusher which can turn out 135 tons of aggregate an hour. Further aggregate plant equipment included a 500-gallon diesel-fuel-oil tank 10 feet long x 4 feet in diameter, and a trailer, set up as a portable machine shop,

equipped with small tools, vises, etc.

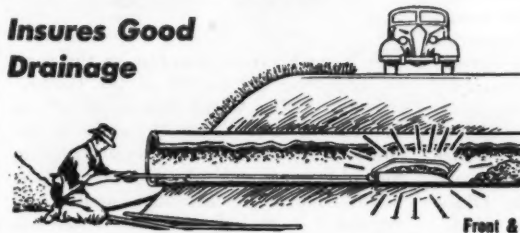
### Personnel

This 2-mile bituminous resurfacing job was done by the Globe Construction Co., Kalamazoo, Mich. M. V. Carmody was Superintendent on the road job, with Angus Banks Superintendent at the asphalt plant.

Charles M. Ziegler is State Highway Commissioner of Michigan.

## MORCO CULVERT CLEANER

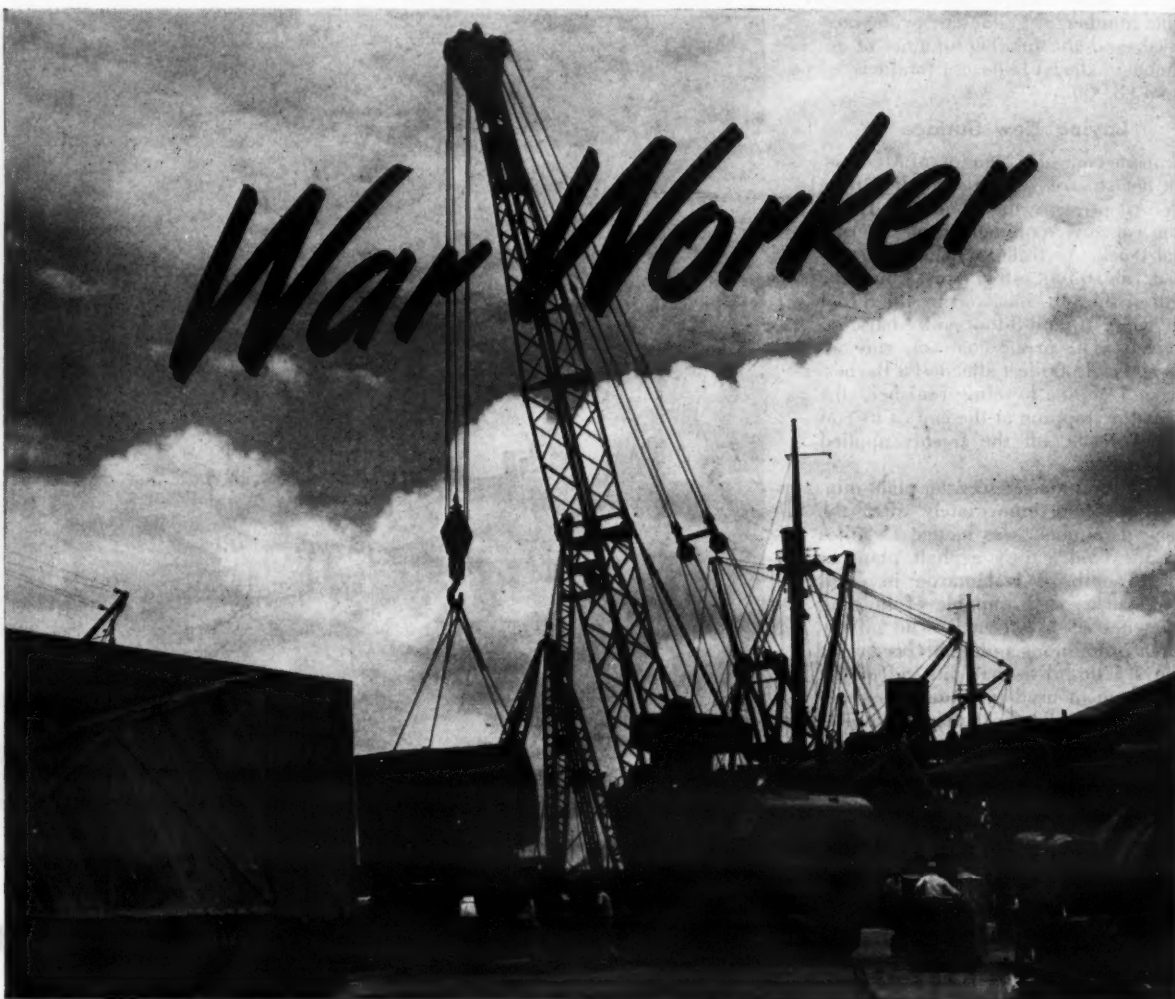
Insures Good  
Drainage



Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating "Morco" is the most satisfactory tool yet developed for this work.

MONARCH ROAD  
MACHINERY COMPANY

Front & Douglas N. W., Grand Rapids 4, Michigan



**N**ot all war workers carry lunch pails and wear badges.

Plenty of them, like the crane in the picture, will never punch a time clock nor boss an assembly line. But they're war workers, just the same.

We're not going to say the obvious thing about Bethlehem Wire Rope, and the way it's helping so many vital machines to keep moving these days. We're simply going to mention that tons and tons of it are giving service all over the world, and that our people are working day and night at the fac-

tory, turning out still more Bethlehem Wire Rope for Government and civilian use.

We'd like to add, too, that Bethlehem rope has been handling some jobs that are 'way off the beaten path. (There's a landing-craft application that's a honey, but details can't be published till after the war.) All this experience is helping us accumulate facts that mean better wire rope. It's helping us make wire rope that will do old jobs better . . . new jobs efficiently.

Remember that, when you go to rereg your machines. Bethlehem

has the background, the materials, the facilities, and the experience. All these ingredients, mixed together and cooked skillfully, mean good wire rope . . . as fine as the market affords. It will pay you to look for the Bethlehem trademark.



**When you think WIRE ROPE**

**. . . think BETHLEHEM**



### Saw and Drill Press On Radial-Arm Unit

A radial-arm unit for form work or even more refined shop work has been developed to handle a saw in cross-cut, miter, rip, bevel, cut-off, compound-miter, bevel-rip, dado, plough, rabbet, shaping, and tennon cuts and a drill press in straight and circular routing, and for regular drilling. It is available from the Machine Tool Division, Red Star Products, Inc., 3455 Vega Ave., Cleveland 13, Ohio. This Multiplex-30A is such a versatile machine that to understand the possibilities and varieties of its operation one should have a copy

of the latest folder issued by this company.

Copies of this illustrated folder "Multiplex-30A, the Radial Arm Saw with the Versatile Elbow" may be secured direct from the manufacturer by mentioning this review.

### H. O. Penn Staff News

Following its customary policy of advancing staff members to keep pace with company expansion, H. O. Penn Machinery Co., equipment distributor of New York City, has promoted Ralph L. Johnson, Sales Manager, to the position of Vice President and Sales Manager.

Mr. Johnson is a graduate of the School of Mines, University of Minnesota, and spent several years in the construction industry and in the sale of construction machinery before joining the Penn organization eleven years ago.

R. E. Reed, known in the construction field as "Ed" Reed, has returned to the sales staff of H. O. Penn Machinery Co. He will be associated with Stewart A. Wade, Branch Manager, and Guy Berger at the newly opened Newington, Conn., branch office where Caterpillar and allied equipment will be sold and serviced. Mr. Reed, who has been connected with the company for a number of years, served with the War Production Board in

Washington, assisting Hamilton O. Penn in the task of organizing the Used Machinery Division. After the completion of the WPB job, he spent a few months with the Michigan Tractor & Machinery Co. before returning to Penn.

### American Cable Div. Names N. Y. Sales Mgr.

Walter E. Moore has been appointed to the position of New York District Sales Manager by the American Cable Division, American Chain & Cable Co. Inc., with headquarters at 230 Park Avenue. Mr. Moore has been with the company for eighteen years.



**A**NOTHER hurry-up job, completed in record time with the usual MultiFoote efficiency, was the building of a West Coast military airport access road requiring 40,000 cubic yards of concrete. Typical of the high hourly production of all MultiFoote 34E Pavers was the pouring of 792 cubic yards of concrete in a nine-hour period.

Note particularly the operator on his high platform which makes possible faster, more accurate work. At the widest angle of the boom the bucket is visible, the pan of the skip is in view and its full width can be seen without stretching around

machinery. A simple control system gives an automatic mixing cycle that utilizes every mechanical advantage for speed. This mechanical cycle can be varied at the will of the operator from automatic to manual operation at any time, allowing him to take full advantage of any condition that might develop. Add to this all the other MultiFoote features and you have the reason why there are more MultiFoote pavers than all others. See your local dealer or write for details.

### THE FOOTE CO., INC.

1916 State Street

Nunda, New York

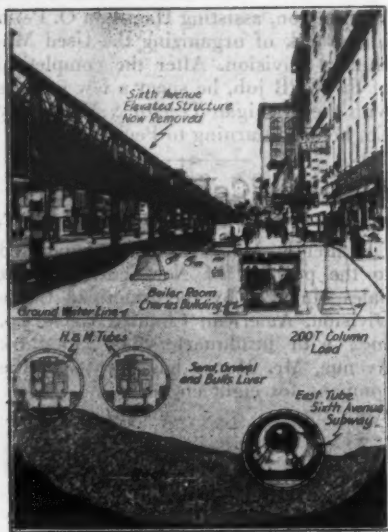


# MULTIFOOTE

## CONCRETE PAVERS







A cross section of the Spencer, White & Prentiss contract for the Sixth Avenue subway in New York, for which Herbert M. Hale was Managing Engineer.

## Herbert M. Hale, Project Engineer

(Continued from page 8)

there will be progress, along with fewer accidents."

### Special City Employee

When the New York City Sanitation Department wanted to build its huge sewage-treatment plant at Ward's Island, it went outside the regular roster of city employees and chose Hale as Chief Engineer of Construction to direct the nineteen contracts that were let for all types of work, including rock tunnels, compressed-air tunnels, open-cut tunnels, sewers, buildings, etc., for a total cost of about \$20,000,000.

On this grand project of so varied a line of construction, there were many problems. The tunnel crossing under the Harlem River presented the one of greatest difficulty. Inadequate preliminary borings had been made in the first planning. Hale stopped further tunnel driving on contract grade and insisted on an elaborate boring research ahead from within the tunnels. This resulted in a major change of the contract in which step shafts were sunk within the tunnels on both sides of the river and the crossing completed in solid rock at a much lower level. The project was thus finished on time, the City was saved the loss of its planned tunnel and a very possible law suit, and through a fair working arrangement in advance with the contractor the total cost came within the gross amount of the contract bid items. Hale stated that the "headache" came, not from the practical dealing with construction problems, but rather from the admixture of several Bureau prerogatives ranging from the legal to the purse string.

### Progress in Foundations

"Great progress has been made in foundation work over the past twenty-five years," Hale went on. "Much scientific knowledge on the behavior of soils has been contributed which has been applied in a practical manner in the modern methods of underpinning buildings in soft ground. This system, which we call the pretesting of underpinning, has made possible our difficult subway construction in remarkably fast time. The use of the "mud-hog" pump and Inter-Pile sheeting are developments in this system which, as a whole, is a real contribution to heavy construction."

"The contractors' hats are off to the mechanical engineers and the machinery manufacturers for the marvelous construction equipment they have brought out since the last war. The crawler tread, for instance, has been a great boon to the construction industry by

taking excavating machinery off wheels and increasing its range of mobility."

Herbert M. Hale's recent work includes construction direction for Spencer, White & Prentiss on New York's new Sixth Avenue subway built during the demolition of the old Sixth Avenue El, and the foundations for the Criminal Courts Building in downtown New York. When the George H. Flinn Corp. of New York joined with the Great Lakes Dredge & Dock Co. of Chicago to start work on the immense Bayonne dry-dock for the Navy in April, 1941, they picked Hale as Managing Engineer to run this huge construction job. Some details of the project, which was completed in two years, are still among the military secrets. It did require an enormous concrete plant, with material being pumped over great distances and placed under 80 feet of water to build a reinforced-concrete mat 20 feet thick.

### Interlude

Since the completion of that project, Hale has been living with his wife at

Orient in the hundred-year-old home that he bought and rebuilt twelve years ago. He redesigned the house, drawing his own architectural plans, and then, with hammer and saw, has made further improvements. He also took an old barn and hen house and converted them into a modern garage, work shop, and a one-flight-up studio.

About four years ago he bought a set of oil colors and has since done enough landscape and marine paintings to cover the walls of his home with creditable art. The wartime shortage of copper has halted the making of the Benjamin Franklin type of street lamp that he designed and built, but Hale can still do wonders on his lathes and saws with a few odd lengths of mahogany or black walnut.

He has just completed making a Victory altar, carved from black walnut, for the 200-year-old Congregational Church at Orient. He says that the inspiration for the altar came one time in church as he heard a fleet of carrier planes pass overhead on their way west—probably

back with their load of wounded from the western front. With one ear on the sermon and with pencil in hand, he sketched the basic design on the back fly leaf of the hymn book. It took a lot of time and material, but Hale gave both freely and is amply rewarded when he sees one of the church members kneeling at the altar praying for a loved one in service.

"It's grand out here at Orient, where you can dig chowder clams in the creek," said Hale, looking over the blue waters of Long Island Sound. "My next job will have to be mighty interesting to lure me away from here. In the meantime, I'll watch the ospreys dive for their fish dinner and continue working on this old mirror someone threw away. I'm making it into a mahogany tea table."

"Construction Safety" points out that it is not only important to have your employees safety-minded; they must also be "safety-habited". Constant reminders and supervision, plus a good example, will help to keep your job safe.

**205  
HALF-YARD**

**UNIT CONSTRUCTION  
FOR  
EASY ACCESSIBILITY**

**KOEHRING COMPANY**  
MILWAUKEE 10, WISCONSIN

*Orders Accepted Now  
for Postwar Delivery*

**HEAVY-DUTY CONSTRUCTION EQUIPMENT**



Machines

of

Construction  
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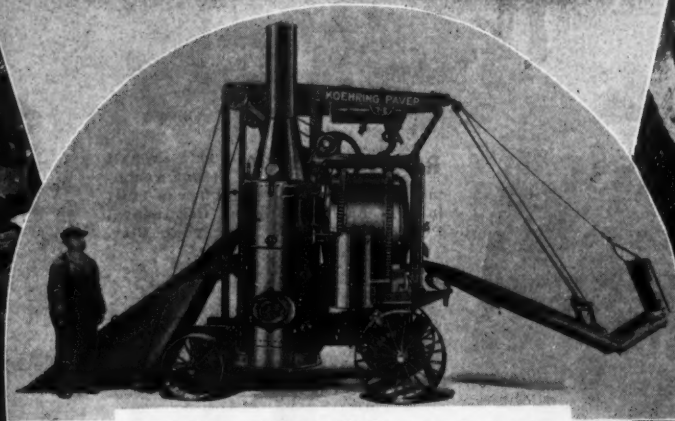
1920

1945

Years Ago



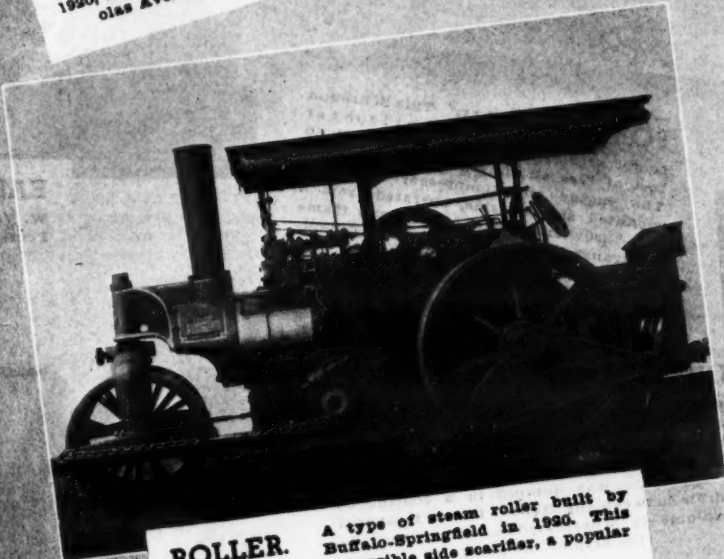
**SUBWAY.** The past 25 years have seen great expansion of New York City subways. Rodgers & Haggerty used this Mayward 1-yard orange-peel bucket, bought about 1920, for subway excavation on St. Nicholas Ave. near 166th St., in 1925.



**1920'S** "last word" in concrete pavers. This Koehring 7-E with steam power was the forerunner of a long line of increasingly larger machines leading to today's giant 34-E pavers.



**WATER** supply has increased greatly in importance to West Coast cities during the past quarter century. On the Hetch Hetchy Dam to impound water for San Francisco, the first of the West's big dams, this Insley tower was used to chute concrete in 1920.



**ROLLER.** A type of steam roller built by Buffalo-Springfield in 1920. This 16-ton unit had a reversible side scarifier, a popular attachment of the day.



**OILER.** Adapted from early street watering carts, this Etnyre Road Oiler of 1912-13 was developed into the first Black Topper in 1923.



**DIRT MOVER.** Horse power in the flesh pushed this first "Bull Dog" or "Marsh Filler", described in a 1917 catalog as "built for filling in ditches, marshes, or for shoving dirt over dump where wagons cannot travel". It was made by the Russell Grader Mfg. Co., which was taken over by the Caterpillar Tractor Co.



**POWER SHOVEL.** The first built by the Bucyrus Co., predecessor of the Bucyrus-Erie Co., was constructed for the Toledo & Ohio Central Railway in 1882 and was still in service in 1920.



1920

## Construction Equipment

Early Models of Machines Developed in the Past 2 Years

**BUGGY RIDE.** This Inseley horse-drawn hot-tom-dump concrete buggy, still in use in 1920, preceded towers and chutes and other modern methods of distributing and placing concrete and was the forerunner of the one-man pneumatic-tired concrete buggy.



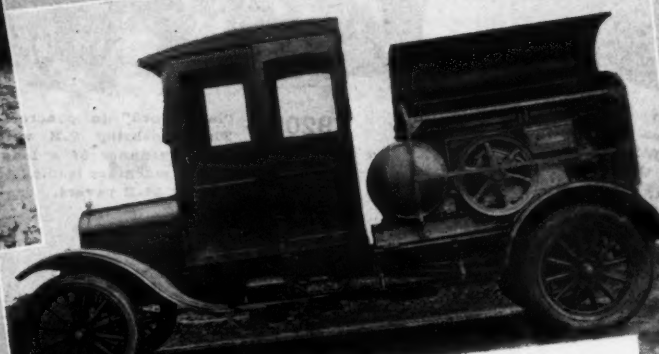
**ROAD PLANT.** This asphalt plant, a Cummer "750-yard road plant", was built in 1914 and sold to the Continental Public Works Co., New York City.



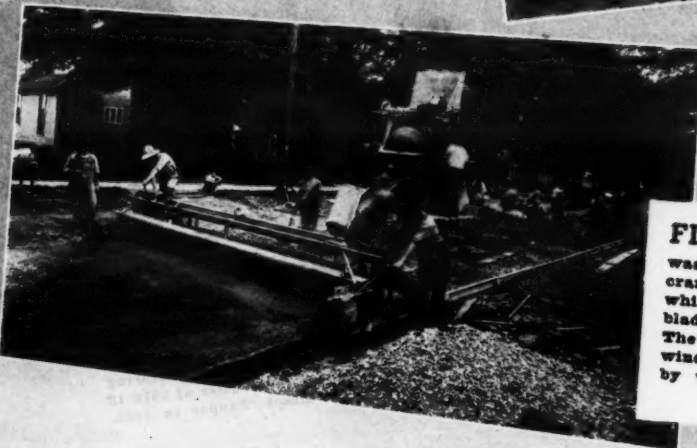
**CRAWLERS.** Athey crawlers were used on this 10-ton logging wagon which was produced in 1920. This was developed into the Athey crawler wagon for rock and dirt moving on construction jobs.



**PORTABLE AIR.** This Schramm compressor, with a displacement of 50 feet of free air, was assembled in 1918. The engine and compressor cylinders, mounted side by side, operated from a two-throw crankshaft without any frame or transmission. The unit was considered a tremendous advance over the popular 15-cubic-foot model of 1912.



**FINISHER.** This early-model Meltzel concrete finishing machine was used on a job in Hiram, Ohio, in 1921. A crank at each side moved the machine forward, while a light strike-off blade and a tamping blade, also hand-operated, finished the concrete. The aggregate was dumped in a continuous windrow between the Meltzel forms, measured by volume in wheelbarrows, and pushed to the skip of the paver.



**ROAD BUILDING.** Many miles of road were built in the 1920's by tractor-elevating-grader outfits. "Broncho Pete" is driving a 1919 Best 60, known as the Muley, which was the first of the track-type tractors without the tiller wheel. The elevating grader is an early Austin-Western model with a bull-wheel drive for the conveyor belt.



**BATCHING PLANT.** This 1922 Blaw-Knox 50-ton volumetric batching plant with steel suspension bin and four batchers is a far cry from the portable sectional speedy weighing batchers of today.



**EARLY PAVEMENT.** W. Va., with a Holt Caterpillar tank, was paving a road.



# Equipment Museum

1945

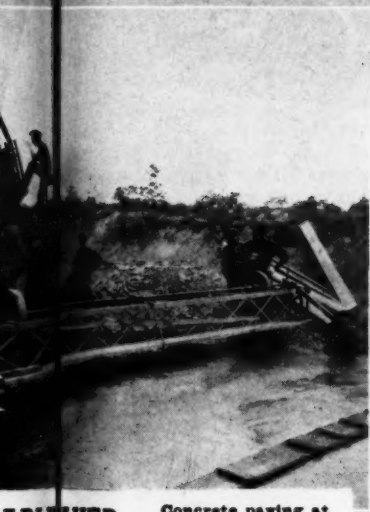
## 2 Years to Serve Highway and Heavy Construction



**NON-TILTER.** This rugged 1920 Rex concrete mixer was sold by Kern, Hunter Inc., of Milwaukee. "Mort" Hunter, a member of that firm and now President of Hunter Tractor & Machinery Co., was one of the eighteen organizers of the Associated Equipment Distributors which was started just a year before C&E Monthly.



**MAINTENANCE.** In 1920, a horse-drawn maintainer, such as this Western patrol grader, was a familiar sight along the dirt roads of this country.



**TAR KETTLE.** The steel wheels of this 1920 vintage Littleford heating kettle seem less obsolete in these wartime days than they would have a few years ago when pneumatic-tire mounting for highway equipment was almost universal.



**PAVER.** Concrete paving at Morgantown, Va., in 1924, with a steam-powered Meltzel hand-operated concrete paver and screed.



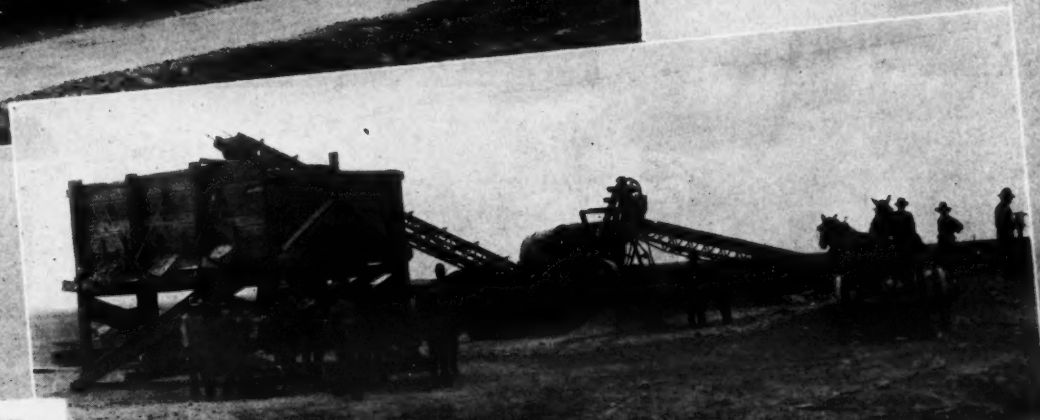
**GRADING.** By 1924, Marion steam mounted shovels were crawler-mounted, although 3-up bottom-dump wagons were still in use to haul away the dirt.



**TRACTOR-GRADER.** Along about 1921, tractors began to put in an appearance to pull the heavier graders which were being developed. This Gallion No. 10 Premier Engine Grader with a 10-foot blade, pulled by an International 15-30-hp kerosene tractor, saw service in Birmingham, Ala.



**GRAVEL PLANT.** The State of New Mexico installed this Iowa Mfg. Co. "920 One-Piece Outfit" at Roswell, N. M., in 1923. The photo shows the method of feeding gravel plants in use then.





# Construction Equipment Museum



**ASPHALT PLANT.** This rail-road-type asphalt plant was built for the Dale Engineering Co., of Utica, N. Y., by Hetherington & Berner, Inc. in 1921.



**THEN AND NOW.** This 1920 mechanical screed finished 350 to 400 feet of 18-foot concrete road in a 10-hour day. In 1944, its modern counterpart, a Jaeger-Lakewood finisher, working behind a Jaeger concrete spreader and two 34-E dual-drum pavers, finished 300 feet of 25-foot slab in a single hour.



**POWER GRADER.** The top tool of secondary-road maintenance and of all finish grading is the modern powerful motor grader of today. This 1924 Austin-Western power grader with leaning front wheels and crawler drive is one of the earliest models of this indispensable road machine.

**DISTRIBUTOR.** With the advent of automobiles and the resultant demand for dustless roads came the development of the bituminous distributor. Kinney Mfg. Co. sold this unit mounted on solid rubber tires to Newton, Mass., in 1919.

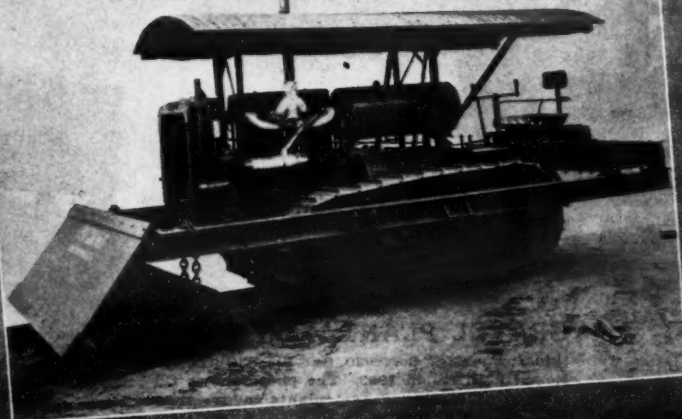


**CRANE.** The truck crane is one of the most versatile and widely used pieces of equipment in the construction field. This Universal crane with a 1/2-yard Blaw-Knox clamshell was used by McCrady Bros. in 1927.



**A REAL FIRST.** Built in 1923 by Bob LeTourneau, this first self-propelled scraper was the granddaddy of today's Tourrapull. It had steel-spoke wheels, five telescoping buckets, seven electric motors, positive dumping, a 20-yard capacity, and a top travel speed of one mile an hour.

**BULLDOZER.** This is the first bulldozer made and sold by the LaPlant-Choate Mfg. Co. in 1923. The rigid sheet-metal blade was adjusted by hand and was designed for Best and Holt tractors, parents of present-day Caterpillars.



**SCRAPER TRAIN.** Around 1927, trains of two or more wheeled scrapers pulled by crawler of Euclid scrapers is typical of the time, before the big Euclids began to roll at greater speeds and with bigger loads.



# Twenty-Five Years Of Highway Research

## The Practical Benefits of Highway Research Have Not Been Spectacular, but They Are Invaluable

By ROY W. CRUM, Director, Highway  
Research Board

† SOMEWHERE in your vicinity is a road that was improved some twenty-five years ago to the best standards of that day. Also nearby there is probably an improved road of recent vintage. By looking at the two, you may see the visible evidence of the accomplishments of research since the beginning of the motor-vehicle era. Come back twenty-five years from now and some of the invisible factors may be apparent. A step-by-step view down through the years would also make an interesting picture.

Into the development evidenced by the differences between these two roads has gone a vast amount of thoughtful study, including not only formal research but on-the-job striving to do a better job in the light of changing conditions. Necessity produced by changing conditions in the development of highway transportation has indeed been the mother of highway research.

This work has not been spectacular. In the unfolding years of activity few dramatic advances in highway technology have arisen to astound the world with their brilliance, but as the years have progressed, each adding its increment to the store of useful knowledge, the result has amounted to the transformation of the local country roads of yesterday into the nation-wide transportation system of today.

### 1,650 Research Projects

Many men, representing Federal, state, and local governments, universities, and industry, have made their contributions. Listed in "Highway Research 1920-1940" and its 1942 "Supplement" (a publication of the American Association of State Highway Officials and the Highway Research Board) are some 1,650 research projects ranging in size from a few tests of materials to the monumental planning surveys of the state highway departments. Eighty-five separate agencies are represented. And it is well known that this compilation is by no means complete. The men who have done this work are important and it would be a pleasant task to compile a "Who's Who in Highway Research" but it would far outrun the available space.

### Application of Research

Many of the findings of the past twenty-five years of research have been applied in practice. Some have not yet overcome the inevitable lag between acquisition of new knowledge and its use, and much of the current work has yet to bear fruit. Some achievements, of course, stand out as landmarks and, without trying for completeness, a few may be mentioned; but even these were mostly the result of growth rather than full-fledged discovery.

The designer of highway lay-outs would be helpless to provide safe and adequate traffic ways without the results of painstaking studies of traffic behavior with respect to such items as sight distance, traffic capacity, and movement at intersections. And would it not be difficult to conceive of building modern pavements without benefit of accurate proportioning, weighing, and full control of concrete materials, or without the use of liquid asphalts and tars? The numerous researches that have led up to what we know today of design of pavement surfaces collectively constitute a prominent landmark.

Construction and maintenance operations have benefited from innumerable studies of details, but one result that stands out is the speed and accuracy of operations made possible by the use of modern machinery. For applications of research, contrast the present 12-yard dirt-moving scraper with the ¼-yard 2-mule scraper, or the concrete finishing machine with the laborer and his hand float.

Traffic research has contributed immeasurably to the safety and adequacy of our highways. A finding of far-reaching practical importance is the fact that highway use is composed primarily of short-haul movement.

### Road Foundations

When we think of the way we blithely

ignored the problem of road foundations in our early work, the practical developments brought about through study of soil as an engineering material are astounding. Do we realize even yet the value of the tools we have in the principles of stabilization and of soil compaction?

As this is written, the weather is too bad to go out and look at examples as suggested in the first paragraph (even if we had the gas), so let's take a mental look. This is even better because we can get better contrast by looking at the road as it appeared twenty-five years ago when first built.

The road builders who started with the motor-vehicle era had only two kinds of experience to guide them, railroad building and road building for horse-drawn vehicles. It is not surprising that in our earlier attempts at motor roads we produced a curious mixture of the two: long tangents on steep-sided embankments with culvert head walls crowding the edge of the roadway, or in narrow cuts with deep side ditches combined

with narrow traffic ways turning practically square corners. The right-of-way was the least that could be used and the area outside of the ditches was generally bare and bleak.

Embankments were expected to settle and often pavement construction had to be deferred for a year or two on that account. And the vital relations we now know to exist between subgrade soil and pavement structure had not been thought of.

The common dirt roads of that day, when properly dragged, were wonderful to ride on when dry, if you weren't eating someone's dust, but were you ever stuck in Mississippi Valley mud? Of course many of these roads we still have with us.

### Concrete and Bituminous Roads

The concrete of twenty-five years ago was not bad. By 1920 we had learned not to pile the aggregate on the subgrade and not to scoop up a lot of dirt with every wheelbarrow load. The mixers did

(Continued on next page)

## LET *Simplicity* BOOST YOUR OUTPUT



Behind the outstanding output records of ¾-, ½-, and ¾-yard Bucyrus-Eries on the fighting scenes and here in America is strong, simple machinery that provides direct flow of power to the point of application. Parts are strong, large, few in number. Machinery is confined to a small area, with a narrow spread of side frames that practically eliminates shaft deflection and insures concentric rotation of parts. The resulting smooth, high-speed performance—easily sustained because maintenance is low—pays big output dividends.

Essential simplicity of design is one of many reasons why you need Bucyrus-Eries on your work. The full Bucyrus-Erie performance story will convince you.

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# Highway Research

(Continued from preceding page)

a pretty good job although the volumetric measurement of the batches gave uncertain composition, to say the least. Even then we had finishing machines which worked very well, but the design probably called for a slab thick at the center and thin at the edges. (Later on we reversed this and now there is a tendency toward uniform thickness.) By that time we had learned not to spread the concrete out in the sun to dry, but the curing methods used were not based on much scientific knowledge.

The principal bituminous pavement of that day was sheet asphalt which had reached a high degree of excellence on city streets but was expensive for rural roads. In some regions bituminous macadam had been extensively developed for horse-vehicle roads, but there was much to be learned about making them stand

up and stay smooth under motor traffic. Most of the excellent types of bituminous roads now in common use have been developed since that time.

A lot has been left out but perhaps you can see the picture. All in all, however, that was not bad road building for the conditions, and if the motor age had not burgeoned so enormously it might have sufficed.

Between the first World War and the present conflict, the United States built a highway system suitable for the swiftly growing use of self-propelled fast-moving vehicles. Development of the system followed the development of the car. Some day we may catch up, but at the beginning of World War II the system was far from complete and contained sections of all degrees of excellence and adequacy. The best examples of the present-day road-building art are a far cry from those of 1920 and are a great tribute to American inventiveness and research.

## Results

What may we see now? Wide rights-

of-way; ample cross sections; easy slopes; wide shoulders; shallow but adequate ditches; easy grades; sweeping curves; wide traffic lanes and plenty of them. The whole area between right-of-way boundaries has been skillfully treated so that the highway blends into the landscape, effective provision for run-off water has been made, and traffic separation structures installed wherever necessary. Culvert structures we do not see, but they are there in ample capacity. Bridges have sufficient traffic-way width. Sight distances are adequate for safe driving at reasonably rapid speeds. You can easily fill in other important details of the picture.

The unseen features are just as important and even more the fruits of organized research. The embankments of the modern road were built by scientific methods which assure stability without distortion. The subgrade soil was analyzed and modified, if necessary, to give proper support. The sub-base is probably a stabilized layer of granular mate-

rial, soil-cement, or soil-bitumen. If the pavement is of concrete, the mixture was carefully proportioned, the aggregates were weighed, the water accurately measured, and close control kept of the variations in the aggregate as delivered.

The care that went into the mixing and laying of the bituminous surfaces may not be apparent but it is evidenced in the uniform, smooth, and non-skid pavement as we ride over it. And it did not just happen; through research and on-the-job study the engineers found how to do it that way.

## More Research Needed

Engineering research without application would be a waste of time. No such waste is apparent in the highway of today and, on the whole, it is a pretty nice job. But, let's not feel too complacent about it. No research writer should ever complete a report without directing attention to further needed research, so I shall use my remaining words to point

(Concluded on next page)



Navigation Lock at TVA's Kentucky Dam

## A Who's Who of Jobs

By RICHMOND SCREW ANCHOR CO., Inc.

"Who do you do business with and where is your stuff used?"

Richmond's answer—We list here only a few of the many larger construction jobs where Richmond's Form-Tying devices have been used.

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It makes no difference to Richmond whether your job entails the use of 100 or 100,000 form-tys, we promise that no detail of service or effort that we can possibly provide will be overlooked in helping you make a larger profit on concrete form work.



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Yankee Stadium  
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STUART, FLORIDA  
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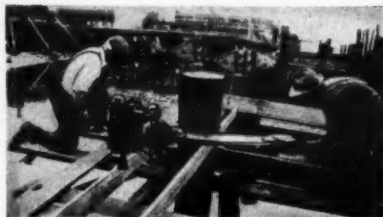
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**PER HOUR**  
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Unskilled laborers can now cut and top piles and square heavy timbers to size with MALL Chain Saws after a few minutes' instruction—at a surprisingly low cost. The 2-cycle design gasoline engine, starts easily... has stall-proof clutch and handle throttle, and uses very little fuel. The 360-degree index permits sawing at any angle. Also Pneumatic models. Electric chain sharpeners are available.

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## Highway Research

(Continued from preceding page)

out that practice and results are not yet perfect.

Traffic behavior and needs are large factors in determining type of improvement, width, curvature, gradient, and allied features, yet we have only scratched the surface in the study of traffic behavior in relation to the physical features of roads. Strange things happened to many early improvements which were not explained until scientific study of soil as highway material was undertaken, and not all of them have been explained yet. For instance, lack of a method of testing a sample of soil that will indicate directly the load-bearing capacity of the soil in place hampers greatly the solution of many problems of design. Too many concrete pavements still warp and twist out of shape and go to pieces mysteriously, and we still are arguing about type and spacing of joints. The chemical nature of bituminous materials is baffling and we do not know how to write an engineering specification for asphalt. How thick to make flexible pavements and their underlying support is a very live problem.

To make the 2,936,000 miles of secondary and feeder roads of this country usable under all weather conditions by the most economical of today's methods would cost unattainable sums of money, but if it could be done the economic benefit would be very great indeed.

Yes, the applications of research to the problem of highway development have paid off in measurably large amount, but we are not out of a job yet.

### N. Y. State Highways Battered by Winter

The cost of temporary repairs and spring seasonal maintenance on New York state highways in the six counties in the Binghamton district alone is expected to amount to approximately \$1,500,000, according to Frank W. Donovan, District Engineer, New York State Department of Public Works. The state roads were badly battered during the winter by heavy wartime truck traffic and, in the absence of new construction, almost constant repairs will be needed on many routes to keep them in use.

Mr. Donovan points out that it is getting harder every year to bring the highways back to a serviceable condition after a tough winter. He commented, "They never will be as good, of course, as they were the year before".

No new construction is contemplated in the Binghamton district until after the war, but post-war plans are being pushed for new roads as soon as materials are available for the work, and man-power is adequate for extensive construction.

### Aeroil Personnel News

Bernard Gould has been appointed General Sales and Advertising Manager of the Aeroil Burner Co., West New

York, N. J., which was recently awarded the Army-Navy "E" as manufacturer of industrial heating equipment. Mr. Gould was formerly in charge of dip-tank sales. Ed Skillman, formerly with the National Association of Manufacturers in New York, has taken over the Weed Burner Division as Assistant Sales Manager.

### Instructions on Use Of Wire-Rope Clips

A revised vest-pocket edition of the Crosby Clip Instruction Booklet CCB-11B has just been made available by American Hoist & Derrick Co., St. Paul 1, Minn. Besides giving full details about the Crosby Clip itself, it contains

a table of the number of clips used for all sizes of rope up to 3 inches as well as instructions, illustrated with diagrams and pictures, for making wire-rope fastenings properly.

Every user of wire rope should have these new simplified instructions which may be secured by writing direct to the manufacturer.

## Digging for a Lost Highway



## with the new Bros Rotary Plow

●They said—"It couldn't happen here"—yet hundreds of streets, highways and roads were actually lost for weeks in the January and February snow storms.

Yes, "it did happen here" and it can happen again. But many cities, counties and states will be ready—for they have found quick snow removal is a necessity when the snow storms come. They have also found—The New Bros Rotary Plow—the answer for quick, economical snow removal—

because its exclusive "snow rake and controlled snow placement" makes it the only rotary of its kind.

It will work in the deepest of snow faster and more economically than any other rotary plow. It can be easily attached to any heavy duty truck. Back of these statements are hundreds of Bros Plows serving cities, counties and states on highways, streets and airports—that give proof, "you get the most with a 'Bros'". Get your orders in now—for the New Bros Rotary Plow.

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A Caterpillar diesel D13000 engine driving a Universal pulveriser and another D13000 engine driving a Cedarapids 18 x 36 jaw crusher in Lloyd McCabe's limestone crushing and grinding plant near Pella, Iowa. Operating 10 hours a day, this plant produces about 500 tons of agricultural lime and road rock.

## Army Obsolete Bridge In Demand Once More

**Portable Steel Unit, Out-Moded by Bailey Bridge. Pressed Into Service On Ledo Road; Back in Favor Again**

A bridge which was in danger of becoming obsolete two years ago is today one of the "hottest" Engineer items in the Army's mammoth supply program. Designed originally as a tactical assault bridge, in which role it was practically superseded by the Bailey Bridge, the Portable Steel Highway Bridge H-20 has now come back into its own as a truss member of the fixed spans which Army Engineers are putting in by the hundreds and thousands all over the world.

Its new usefulness was discovered 8,000 miles away from the theater for which it had been intended. Nelson G. Tayman, resourceful civilian bridge engineer from the War Plans Division, Office of Chief of Engineers, was helping Brigadier General Lewis Pick design some Ledo Road bridges which would stand up through the next monsoon season. The existing low priority for that theater had put into the depots in Assam only these out-moded steel truss panels, all American production of Bailey Bridge sections being reserved for the ETO.

Working on the spot with Chinese engineers, Tayman arrived at a method of using the panel sections, together with well anchored timber cribs, to build a fixed bridge stout enough to stand up to the north-Burma monsoons. The design proved so adaptable that depot stocks were soon cleaned out, starting a chain of new orders which continue to pile in, proving that you can't keep a good bridge down.

The H-20 bridge section is a prefabricated box truss of high-strength steel, 12½ feet long, 2 feet wide, and 6 feet deep. Each section weighs 1,730 pounds. The sections are connected end to end with 25-inch bolts. Normal spans up to 125 feet in length can thus be put together from the sections quickly and with the simplest mechanical equipment.

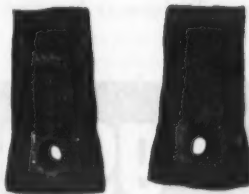
For its original use as a tactical assault bridge, the H-20 was provided with erection jacks and rollers similar to the Bailey Bridge launching equipment. Because of the weight of the individual sections, a truck-mounted crane was normally used to unload them from the cargo trucks and spot them in convenient places for assembly. Heavy-duty winches on either trucks or tractors, plus a gin pole on the far bank, are the only mechanical aids necessary for erection, and normal erection time for a 125-foot bridge is three hours for an experienced Engineer platoon, under favorable conditions. The bridge may be launched in one clear span out over a ravine or narrow stream in cantilever fashion, the

bridge being pushed forward as new sections are bolted into place in the rear.

On the nearly 700 bridges required along the Ledo Road, General Pick's Engineers used whatever bridge handling and launching equipment they could muster on the spot. Sometimes a tractor towing a crane which in turn was pulling the forward end of the completed girder would sash across the stream to move the truss into place on top of the cribbing. Several trusses placed side by side and strengthened against side sway by lateral bracing were all that was needed to support the bridge flooring.

The light weight and demonstrated versatility of the box truss is important logistically in the Army's plans for replacing, to the minimum extent necessary for Army needs, the thousands of bridges wrecked either by our own Air Force or by the enemy's demolition. Allowing for a longer clear span than timber or the usual steel-girder material which can be found on the site, the H-20 Portable Steel Highway Bridge is a good piece of equipment to have around.

## BUCKET TEETH VETERANS NOW FULL OF YOUTH!



**GOOD AS NEW!** That's what you'd say about these worn drag line bucket teeth after they had been salvaged with Coast Metals Hard-Facing! In fact, they are now *better than new*. Because Coast Metals Hard-Facing makes them extra-resistant to abrasion and wear, they will outlast and outwear ordinary teeth several times.

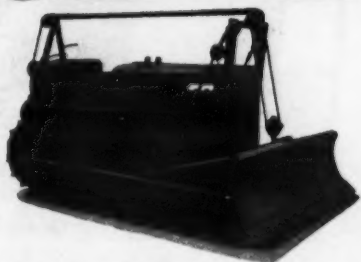
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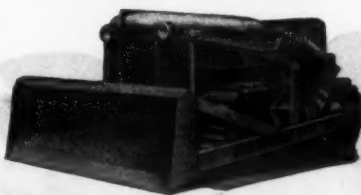
CABLE DOZECASTERS with angling blade for Allis-Chalmers HD-10 and HD-14 Tractors



4-WHEEL HYDRAULIC SCRAPERS  
Capacities: 8-10-15 cu. yds.



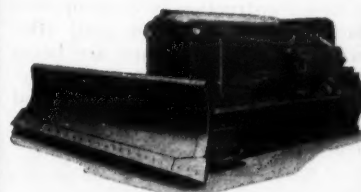
4-WHEEL CABLE SCRAPERS  
Capacities: 11-15-20-25 cu. yds.



HYDRAULIC BULLDOZERS with fixed blade.  
For all Allis-Chalmers Tractors



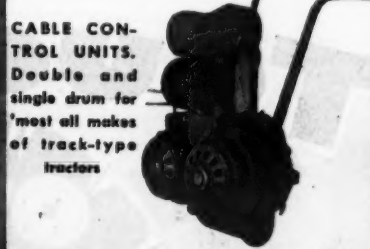
HEAVY DUTY RIPPER  
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British Combine Photo

A wire-mesh and coconut-matting road constructed through a mangrove swamp in Burma for the transportation of supplies to British and Indian troops in forward areas.

## Traffic-Line Paints And Why They Fail

The comprehensive report of Floyd O. Slate, former Research Chemist at Purdue University and now associated with Houdaille-Hershey Co., Decatur, Ill., on thermosetting synthetic-resin paints for concrete-pavement markings, to be published in the current "Proceedings" of the Highway Research Board, contains several interesting findings and helpful conclusions. The study was designed to determine the cause of failure of present paints used on concrete pavements and to find paint and painting methods to overcome these causes.

Both laboratory and field tests showed that paints fail principally by scaling due to loss of adhesion between the paint film and the concrete. The presence of water is responsible for this loss of adhesion. The water, coming from the moist soil beneath the pavement, travels upward through the concrete and evaporates from its surface. The water traveling upward carries soluble salts with it; these salts are deposited upon evaporation of the water. The paint film offers resistance to the passage of the water vapor and to the growth of the salt crystals, and the resulting forces may break the bond between paint and concrete. The surface of the concrete itself may be disintegrated by the growth of these salt crystals. The thickness of the paint film, which governs its resistance to water vapor, has a marked influence on the rate of scaling of some paints.

Laboratory and field tests, designed to compare the durability of standard with proposed concrete-highway paints, showed that the thermosetting and thermoplastic synthetic-resin paints tested had far better water, alkali, and abrasion resistance than standard paints. It was concluded that the baking-type paints and the strongly polar thermoplastic resin paints tested were suitable, satisfactory, and superior for concrete highways.

Following a detailed description of the methods of making the tests and the baking of the thermosetting paints with infra-red lamps, the author presents the following conclusions:

1. Concrete-marking paints, except in areas subjected to heavy abrasion, fail principally by scaling due to loss of adhesion between the paint film and the pavement.

2. Laboratory tests indicate that loss of adhesion of concrete-marking paints results partly from vapor pressure differences on the two sides of the film, caused by the resistance the paint film offers to evaporation of water through itself.

3. Laboratory tests indicate that loss of adhesion of concrete-marking paints results partly from the formation of crystals of soluble salts under the paint film upon evaporation of water from the concrete through the paint film.

4. Laboratory tests indicate that loss of adhesion of concrete-marking paints results partly from the superficial surface disintegration of the concrete by growing salt crystals.

5. Preliminary field tests indicate that marking paints fail sooner on new than on old concrete, probably because of the presence of more soluble salts and greater alkalinity.

6. Laboratory and field tests indicate that baked paints, based on thermosetting synthetic resins, are more durable on concrete pavements than standard oleoresinous concrete-marking paints, natural-resin marking paints, and most cold-cut thermoplastic synthetic-resin marking paints.

7. The baked paints tested, based on thermosetting synthetic resins, were superior in laboratory tests for water, alkali, and abrasion resistance to standard oleoresinous concrete-marking paints, natural-resin marking paints, and most cold-cut thermoplastic synthetic-resin marking paints.

8. Because of the resistance of the

partially set film to expanding water vapor from the concrete, baking paints may blister when baked on concrete unless the film is thin enough to permit

ready passage to the water vapor or unless the pavement is dried before application of the paint.

(Concluded on next page)

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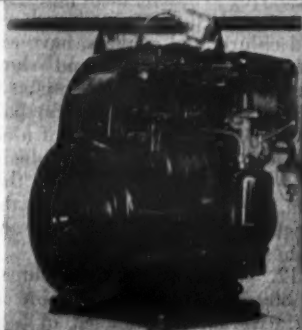
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## Traffic-Line Paints And Why They Fail

(Continued from preceding page)

9. Some of the baked paints tested, based on thermosetting synthetic resins, held glass beads firmly.

10. On the basis of theoretical considerations and other experimental data, air-drying synthetic-resin paints containing strongly polar groups, such as vinyls and chlorinated rubbers, have excellent adhesion to concrete and should be studied in extensive field tests as to suitability for concrete-pavement paints.

11. Most rapid heating of a concrete surface was obtained by placing the infra-red lamps very close to the paint film, about 1 inch, even though the focal length of the lamp used was about 12 inches.

12. In the laboratory, temperatures of 300 and 400 degrees F on concrete surfaces can be obtained in 5 and 10 minutes, respectively, using 250-watt infra-red lamps. The temperature will

be maintained above 200 degrees F for at least 10 minutes after radiation has ceased.

13. The baking paints used in this investigation can be baked immediately after being applied, without waiting for them to air-dry.

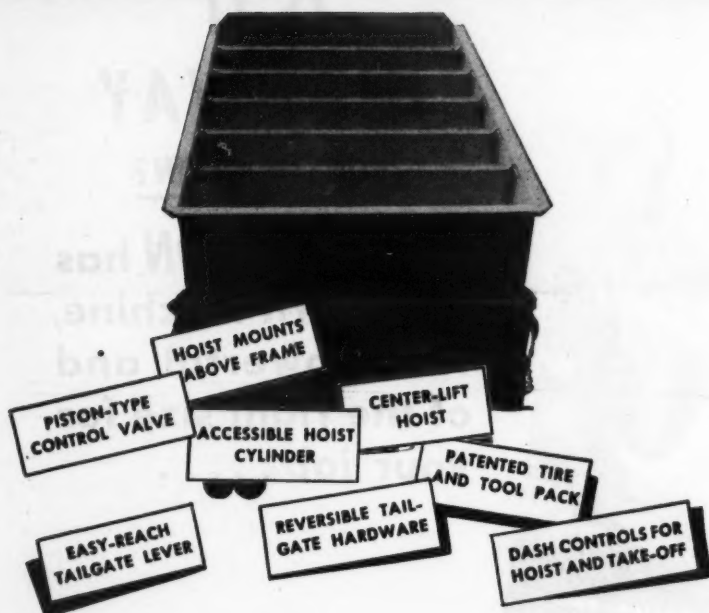
14. The minimum baking times of the paints tested lie between 5 and 10 minutes, depending on the composition of the paint, when G-E 250-watt R-40 lamps are used at a height of 1 inch.

15. These data confirm those obtained by previous investigators, in that laboratory test data correlated well with field performance.

The report as published will contain a rather complete bibliography of the literature on road-marking paints and other information relating to the various parts of this study. The "Proceedings" of the Highway Research Board for 1944 is to be issued later this year.

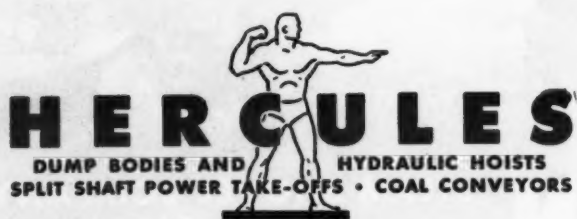
*The "Mighty Seventh" War Loan Drive is on. The men at Iwo Jima gave their lives. Can't you lend your dollars?*

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## Hooks and Ferrules

### Used With Wire Rope

A new illustrated folder and price list of Young Silver Line manganese Bardon choker and butt hooks and Maxten metal-alloy ferrules and tools for attaching the ferrules, with a complete descrip-

tion of the method of attaching the ferrule, has recently been issued by Young Iron Works, Seattle 4, Wash. Copies of the bulletin will be mailed immediately to readers of CONTRACTORS AND ENGINEERS MONTHLY who write direct to the manufacturer and mention this review.

## Deep Digging...

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Wellman Buckets, in Power Arm and Multiple Rope Types develop great digging power. They bite into frozen ground, hard clay or shale, and come up with full loads.

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# Strong County Units Needed for Success

## Many Well Organized County Road Depts. Developed in The Past 25 Years; More Qualified Men Needed

By RAYMOND B. TRAVER, County Superintendent of Highways, Onondaga County, N. Y.; President, Association of Highway Officials of North Atlantic States; Past President, County Officials' Division, American Road Builders' Association

During the past quarter century, there has been considerable progress in the field of county highway engineering in certain localities; in other sections, however, the position of the county engineer has not advanced appreciably. This is due to the failure of these localities to demand an adequate secondary system of roads, intermediate between the state highways and the rural or town roads.

In states where, because of the density of population, greater demands are placed upon the town highway systems, far beyond the capacities or abilities of the town superintendent to construct and maintain them, you will find the need and demand for an efficient county organization to provide overall plans, design, and supervision for construction and the maintenance of the completed systems. In metropolitan areas, county engineers have developed, in the past twenty-five years, from supervisory engineers over local or town work into officers demanding highly trained assistants. Many county officials in this work equal or exceed many of the state highway engineers of thirty or forty years ago.

As we spread out from the metropolitan areas, the needs of the counties are less and the necessity for secondary traffic routes decreases. This lessens the demands upon the county highway organization and diminishes the importance of the county highway superintendent or engineer. In many of the rural states, the position of county highway engineer has little professional or even political standing.

### Qualified Engineers Needed

In every state, there is real need of a secondary system of highways to serve as feeders to the state and Federal systems. The development of this secondary system is dependent upon the ability and energy of the men selected to head the county highway organizations.

Let us take, for example, the progress of the county superintendents in New York State. Forty years ago, the position was created by the Legislature. Their duties were to supervise the efforts of the town superintendents. The positions were filled by men from all walks of life, and many of them developed into real highway builders. Not more than two or three of them were engineers. In a very few years, many of the counties saw the possibilities of the development of a county road system. These counties were the ones which employed an engineering force and developed an organization to plan and construct their system. As some of these earlier officers were replaced, their positions were filled by engineers. In the past twenty-five years, New York State county highway organizations have been expanded, without exception, into efficient workable units, invariably headed by engineers.

It was quite a surprise to the writer to find, on inquiry about two years ago, that out of the 3,000 counties in the United States, the highway departments of only about 800 were headed by engineers and that only approximately one-half of these were qualified through their

own organizations to make surveys, plans and estimates for highway construction. This condition is due, to a large extent, to the method of selection of the county engineer or surveyor, term of office, and salary. We find that in many states the office is elective and open to anyone who cares to "run". In other localities, the position is a political football to be passed around every two years or so to someone who is willing to take over the work at the salary offered. In the more progressive counties, the appointments are made by a board or commission which has general supervision over the county road system, while in a few of the states, the position is protected by Civil Service and the selection is made from a list of candidates who have qualified in an open

competitive examination. Many of the methods enumerated are not conducive to the development of an efficient county organization.

The counties today are in much the same position as many of the state highway departments were when Federal Aid first became available. You will recall that a great number of the states did not have organizations which could prepare the necessary plans and supervise the

construction of roads to the satisfaction of the Bureau of Public Roads, now the Public Roads Administration. Today, however, every state in the Union has an efficient organization. This is due, to a large extent, to their desire to participate in Federal-Aid funds and to meet the standards of design and construction required by the Public Roads Administration.

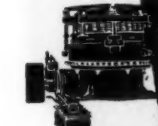
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**MONDIE DROP and UPSET FORGINGS**  
FOR CONSTRUCTION EQUIPMENT  
Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.  
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**MONDIE FORGE COMPANY INC.**  
10299 Berea Road Cleveland 2, Ohio

WILL YOUR PLANT BE *ready*  
to meet *after-the-war* COMPETITION?



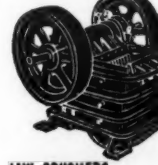
PRIMARY BREAKERS



GYRASPHERE CRUSHERS



INTERCONE CRUSHERS



JAW CRUSHERS



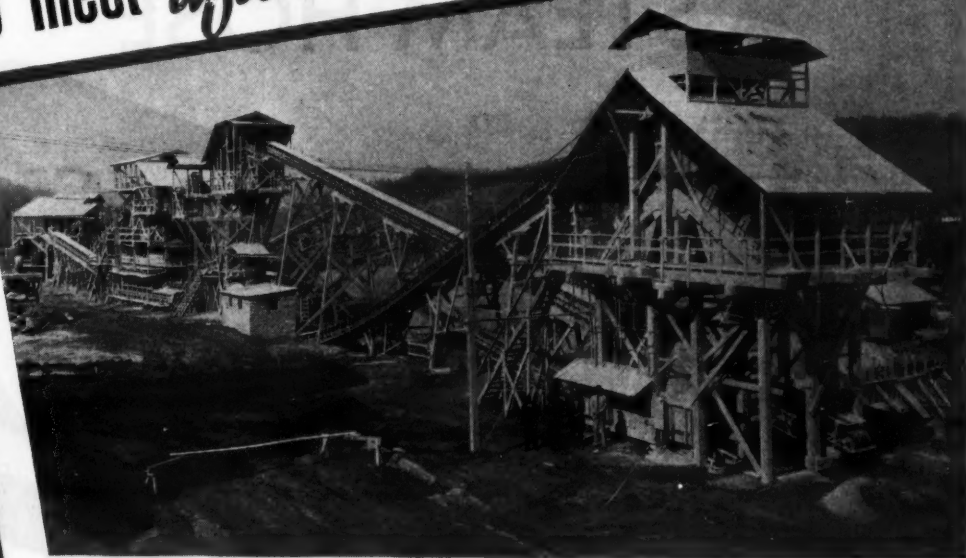
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PULSATOR VIBRATING SCREENS



HEAVY DUTY FEEDERS



Complete modern Tel Smith plant  
... producing both coarse and fine aggregates in several sizes.

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*Equipment*

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## Strong County Units Needed for Success

(Continued from preceding page)

Last year the County Officials' Division of the American Road Builders' Association made a determined effort to secure in the Federal Highway Act recognition and post-war funds for farm-to-market roads to be expended under the direction of the counties. The reason that this recognition was not received is that too few of the counties are properly organized to carry out efficiently the design and preparation of adequate plans. Neither do they have proper inspection forces to obtain the results required by the Public Roads Administration. This is certainly not the fault of Congress or the Public Roads Administration, but is largely the fault of the county men themselves, in not having trained engineering organizations ready for the work.

Several years ago, the American Road Builders' Association endeavored to or-

ganize the counties and to assist them in developing their departments on a broader scale. The lack of interest in many of the states was appalling. Some of the counties were content to continue with conditions as they were. Self-satisfied, as it were, they did not want to be disturbed in their reverie. The more progressive counties were in the minority. It is not to be expected that this minority could carry the burden for the entire country, so the counties as a whole lost out.

### Big Selling Job Ahead

If the counties, as a whole, are ever going to advance to a point where they can hope to obtain recognition, much will depend upon the engineering ability and salesmanship of the heads of the county highway organizations. The localities must be sold on the need of a secondary system of roads and also on the need of qualified men to plan and develop this system. The selection of men to fill these important positions will then be given more serious considera-

tion. Retention of the individual in office will depend entirely upon the results obtained by him. Salaries will be increased sufficiently to hold the efficient ones in office. State and national organization will be of great help, providing there is active participation in these organizations on the part of each county highway director or engineer.

### Army-Navy "E" Awards

For the fourth time, employees of the DeVilbiss Co., Toledo, Ohio, manufacturer of spray painting equipment, air compressors, and similar items, have won the Army-Navy "E" for high achievement in the production of war material. The workers' first citation was received in December, 1942.

E. I. du Pont de Nemours & Co., Wilmington, Del., has passed the 100-mark in "E" awards and stars for war production. Thirty-three of the company's plants have received the award, and a total of 70 stars has been conferred.

On March 23, formal recognition of

its notable record in the production of war equipment was given to the Marmon-Herrington Co., Indianapolis, Ind., when the Army-Navy "E" Award was made to that company. Tanks, trucks, and armored vehicles in vast numbers are Marmon-Herrington's contribution to the war effort.

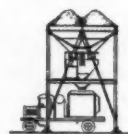
### AS YOU LIKE IT...



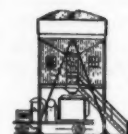
... A Batching Plant That Grows with Your Business!

## JOHNSON Step-by-Step BINS

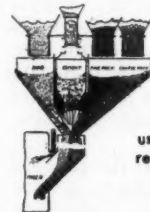
Minimize your investment. Add units as needs grow. Boready for quick expansion, if postwar opportunities warrant—30, 60 or 120 yards—as you need it.



At left—basic 30-yard bin with 2 or 4 compartments. Below (at left)—Next step—60-yard with 4 compartments. Very flexible—The 4 compartments may be used for 2, 3 or 4 aggregates without any change of partitions. Central cement compartment may be added at any time.



120-yard plant is shown at right, the one you will need when your contractors call for concrete in a hurry. With this "Step-by-Step" plan, you make a safe, profitable investment.



Of course the JOHNSON patented "CONCENTRIC AGGREGATE CEMENT BATCHER" is an integral part of any good batching plant. This batcher will use either bag or bulk cement with real efficiency. FLEXIBILITY? YES!

Write for full information today.

THE C. S. JOHNSON COMPANY  
(Kochling Subsidiary)  
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- ★ Buy War Bonds
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## The Long-Service, Super-Safe STEAM HOSE

A Goodall "Standard of Quality" product, made from the best available materials including high-tensile asbestos, mandrel cured. Tube provides exceptional resistance to excessive temperatures. Extra safety is assured by special construction which retards escape of steam if hose is punctured. Will withstand extreme flexing.

For working pressures up to 200 lbs. and super-heat steam temperatures up to 400°F.

The qualities that make "Inferno" so safe and reliable under the most severe conditions, assure even greater economy when hose is used for milder types of service... wherever steam hose is required. Sizes: 1/2" to 2 1/2" inclusive; maximum lengths of 50 feet. Contact our nearest branch or main office for details.



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V-MAIL IS FAST!

Established 1870



# Montana Tunnel

(Continued from page 31)

mounted on a shop-built skid frame which was attached to the paver and moved with it. The boom and bucket were removed from the paver which delivered the concrete directly from the second drum into the placer which discharged the mixed concrete under pressure through the placing ports into the top lining forms. Placing was alternated from side to side so that the two men could use electric vibrators inside the form to eliminate honeycomb from the non-reinforced walls and roof.

Form No. 1 began work 2,157 feet in from the east portal, pouring against bulkheads at both ends, and was then moved east. This form continued in this direction until it reached a truck turn-around, a distance of 840 feet, making 21 pours. From this point it jumped 16 pours and then was used to finish up the remaining 15 pours to the east portal. Rolling form No. 2 began work at the west portal, pouring against a previously completed section of the portal, and made 21 pours. It was then moved through the lining completed by form No. 1 to the truck turn-around, from where it made 16 pours to complete the job.

Daily pours alternated between the two forms. From 8 to 15 hours were required to pour a 40-foot monolith, depending on the amount of trouble encountered. The main difficulty was the rapid wear of the placing pipe. The gravel used was almost all fractured and quite hard, resulting in heavy wear.

When pouring No. 2 form, it was necessary to move the paver and placer back through form No. 1. This also required that the batch trucks move through form No. 1 to the paver. As the stub axles of the form did not project beyond the rails, and as the cross bracing could be dismantled, there was no obstruction to the free passage of this equipment.

Moving and resetting the rolling forms was a comparatively quick and simple operation. The top and bottom transverse struts were first removed. Then, with the help of the hydraulic jacks, the forms were raised to release the wood blocking under the feet of the vertical posts. Using the Joyce trench jacks to pull the forms in slightly broke the bond and the form section was lowered on the hydraulic jacks until its weight again rested on the wheels on the steel rails. Two Tugger air hoists mounted on the forms then moved the section ahead, using cables attached to the permanent tunnel timbering. When advanced to proper longitudinal position for the next pour, the form was again raised and blocked into proper vertical position.

## Cold-Weather Provisions

Although extremely cold weather was anticipated at the altitude and latitude of this tunnel-lining operation, the interior of the tunnel bore was easily kept warm enough to permit proper curing of concrete without extensive precautions. During mixing, the batches were heated in the mixing drum by a Kerosene torch. The stockpiles of aggregate had become dry enough before cold weather to eliminate freezing in the piles. Mixing water was heated as required at any one of numerous auxiliary storage tanks of the water system, and finally passed through a threshing-machine engine. The concrete was placed in the forms at 60 to 65 degrees and was then enclosed by dropping canvas doors on both sides. A temperature of about 60 degrees was maintained around the fresh concrete for 32 hours. Kerosene salamanders were used for heating. In general, after the 32-hour period, the temperature around the concrete was kept at approximately 50 degrees.

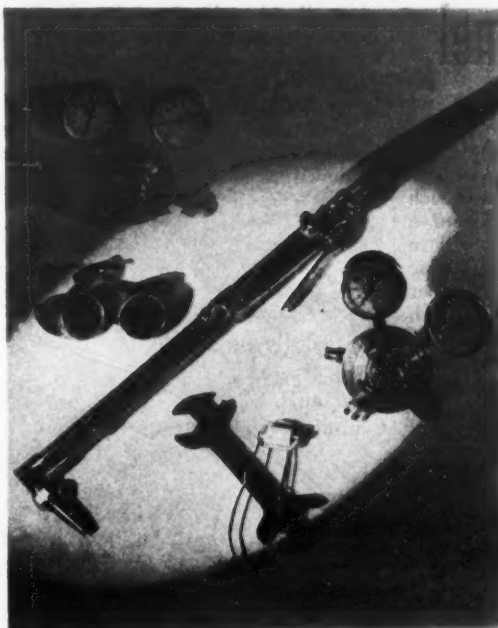
The ventilation factor was the one

item which actually determined the temperature inside the tunnel during pouring operations. Enough air had to be allowed to pass through the tunnel to keep it clear of smoke, and on very cold days it would have been a real problem to keep the temperature high enough. At both ends of the tunnel, doors were installed which could be raised and lowered for the passage of trucks and equipment. A 6-foot square door which could also be raised or lowered was constructed at the top of each portal opening to provide ventilation. Fortunately the weather during the concreting remained above zero, so that the contractor was able to keep the tunnel warm enough for proper concrete curing and at the same time sufficiently ventilated for the health and safety of the workmen.

## Mix Design

Careful investigation of the characteristics of the aggregates proposed for use was made by the Railway's engineering forces prior to the commencement of

(Concluded on next page)



## This One Will Stay On the Job Longer

Often a good cutting torch prevents a costly shut-down of operations.

You cannot purchase a more dependable cutting torch—or one of wider range—than Victor.

## Victor Equipment Company

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# VICTOR

Ad 104



"...my motors show  
80,000 miles  
without major repairs"

"...we have the distinction of being the first Ring-Free users in Buffalo. Our first trial was in two Ford trucks seven years ago.

...our fleet has increased to fourteen trucks including Autocars, Internationals, Fords and one Chevrolet.

...trucks are all used in hauling sand and gravel...the hardest kind of work on trucks as roads are bad...loads are heavy. Due to conditions there is a constant uneven strain on motor bearings.

...if Ring-Free did not have a tough film strength that protected these bearings my motors would not be able to show 80,000 miles without major repairs as many of them have.

...Ring-Free's ability to penetrate even to the top of the pistons and keep the upper rings free gives my motors all the power they were intended to have.

...my first International truck went 110,000 miles with only \$50 repairs...proper lubrication was responsible."

Excerpts from letter of—

*George Muellerbauer*

George Muellerbauer  
205 Courtland Avenue  
Buffalo, New York

**MACMILLAN  
RING-FREE  
MOTOR OIL**

Operators of all types of equipment report lower-cost, more efficient performance with Ring-Free Motor Oil. Find out how Ring-Free can help lick your toughest lubrication problems. ...Phone or write the nearest Macmillan office.

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## Montana Tunnel

(Continued from preceding page)

concreting operations. It was ascertained that a concrete having a compressive strength of 4,000 pounds per square inch in 30 days could be secured from a concrete mixture of 1:2.4:3.7, with a cement content of 5.75 sacks per cubic yard and using 5.75 gallons of water per sack of cement to give a 3 to 4-inch slump. An admixture of 1 pound of Pozzolite per sack of cement was included in the design. The mixing time specified was 60 seconds in a single-drum mixer or 30 seconds in each drum of the double-drum paver. Actual batch weights per sack of cement in the 5-bag batches for the 1-yard Smith mixer and 6-bag batches for the 34-E paver were:

Sand	216 lbs.
Crushed gravel	357 lbs.
Water	47.6 lbs.

Gradings of the fine and coarse aggregates used were as follows:

Fine Aggregate	
Size (Square Openings)	Per Cent Passing
No. 4	98-100
No. 8	85-95
No. 16	63-80
No. 30	40-60
No. 50	12-30
No. 100	0-7
Fineness modulus 2.96 to 3.00	

Coarse Aggregate	
Size (Square Openings)	Per Cent Passing
1 1/2-inch	100
1 1/4-inch	95-100
3/4-inch	40-70
3/8-inch	5-20
3/16-inch	0-4

Both sand and gravel were furnished by the Helena Sand & Gravel Co., Helena, Mont., while Red Devil cement in cloth sacks, and later in bulk, was shipped from the Trident plant of the Three Forks Portland Cement Co.

### Personnel

The concrete work at the Northern Pacific Railway tunnel near Bozeman, Mont., was performed as part of the contract for the construction of the tunnel, awarded to J. C. Boespflug Construction Co., Seattle, Wash., on December 12, 1943. R. I. Riedesel was Job Manager and Ollie Edsal was Concrete Superintendent. For the Northern Pacific Railway, the work was under the general direction of Bernard Blum, Chief Engineer, with D. H. Shoemaker, Assistant Engineer in charge at the job, assisted by W. G. Ashworth, Resident Engineer, and L. W. Brown, instrument man.

### Concrete Pipe Assn.

#### New Directing Heads

Howard F. Peckworth has resigned as Assistant to the Secretary of the American Society of Civil Engineers to become Managing Director of the American Concrete Pipe Association, Builders Bldg., 33 W. Grand Ave., Chicago 10, Ill. After graduating from Princeton University in 1926, Mr. Peckworth spent fourteen years in responsible charge of heavy construction in various parts of the country. Starting with several years' experience in subway and tunnel construction in New York City, he later became Field Engineer in the construction of Tygart River Dam in West Vir-

ginia, Resident Engineer for the Birmingham Industrial Water Supply Commission on the Inland Dam, and Senior Engineer on the Santee-Cooper Project in South Carolina.

At the same time, T. J. Kauer has been appointed Assistant Managing Director of the American Concrete Pipe Associa-

tion. Mr. Kauer has been Assistant to the President and Washington representative of the Association and will continue his office in the Munsey Bldg., Washington, D. C. Graduating from Ohio State University in 1928, Mr. Kauer was for many years an engineer with the Ohio Department of Highways

in Cleveland and Columbus, terminating his employment as Chief Engineer of Design of the Cleveland Planning Office in 1940 to enter government service as an airport paving engineer with the Civil Aeronautics Administration in Washington. He joined the staff of the American Concrete Pipe Association in 1941.



MARION'S scientifically engineered construction of this tandem trailer dump body enables you to haul maximum payload without waste of gasoline and excessive tire wear. You get top durability, yet over-all weight is remarkably light. The body, 18 feet long and 22 cubic-yard capacity, will handle 18 tons of material without strain.

MARION heavy-duty bodies are available with either twin or single telescopic hoists. Choose from a complete line of standard equipment, or consult MARION engineers for special designs for your individual hauling requirements.



See Your Local Distributor or Write  
THE  
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## MARTIN TRAILER

—4 models—  
7, 10, 15 & 20-ton capacities

Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL....

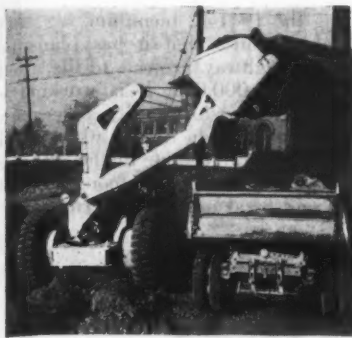
Sold by all Caterpillar Distributors.

WRITE FOR BOOKLET

**Martin Machine Company, Kewanee, Ill.**







The new Jaeger Fleetfoot loader.

### Swing-Type Loader. Crane and Excavator

A swing-loader or excavator, with interchangeable buckets of  $\frac{1}{2}$  to 2-cubic-yard capacities, has been announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. This new Fleetfoot loader has a 180-degree swinging boom which enables it to load trucks from either side without need for backing and turning the entire machine. Crowding, hoisting, swinging, and dumping are accomplished in one continuous movement. Power control for the buckets enables the operator to dump as desired and to close the bucket while it is being returned to a loading position. There are two speeds for the operation of the boom, independent of traction.

The machine is built to work closely alongside trucks in alleys or crowded places, and the swinging boom also enables it to dig outside its own wheels when used as an excavator.

The Fleetfoot loader is powered by a 65-hp gas or diesel engine and has front-wheel drive through large pneumatic-tired wheels which carry 80 per cent of the load. Its low-gear traction speed of  $\frac{3}{4}$  mph gives it ample crowding power to load practically any material, to do grading, backfilling, and light excavating work, as well as to serve as a prime mover for trucks and freight cars. It has six forward and six reverse travel speeds up to 15 mph and is equipped with Vickers power steering.

With crane booms up to 25 feet long which can be installed as an attachment, the machine extends its service for pipe laying, form handling, pole setting, and light steel erection. A cable-controlled blade for light bulldozing is also available. Its regular work for contractors and county and state highway departments ranges from handling stone, earth, brick and coal to snow and cinders, and from digging, loading, and leveling to clean-up work and emergency service on washouts and landslides.

The machine was originally developed for the Navy, which has many now in use. A complete catalog on the Fleetfoot may be obtained by writing direct to the manufacturer.

### Hard-Facing Alloys In Equipment Salvage

The use, general composition, physical properties, sizes, and other details of various types of hard-facing alloys, and their place in the ceaseless battle to minimize abrasive wear on industrial equipment are treated in a 20-page booklet received from the Stoddy Co., 1136 W. Slauson Ave., Whittier, Calif. Following a general discussion of hard-facing as a means of increasing the life expectancy of machinery are several pages of specifications, and an illustrated section giving specific directions for hard-facing clamshell bucket lips, tractor rollers, and similar equipment; the alloy recommended; and the preferred method of application.

A 16-page  $8\frac{1}{2}$  x 11-inch catalog, "Hard-Facing—Industry's Weapon Against Wear," describes in detail the various types of Stoddy hard-facing alloys, lists many industrial applications for hard-facing in equipment conserva-

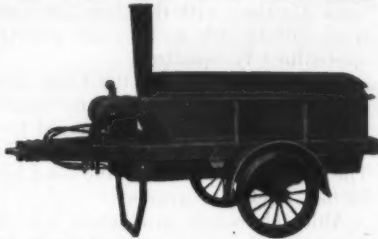
tion, is well illustrated, and contains four pages of specifications.

Copies of this literature may be obtained direct from the company upon request and reference to this item.

### Wickwire Spencer Elects Bussmann Vice President

The Wickwire Spencer Steel Co., New York City, manufacturer of wire rope and cable, guard rail, fabric reinforcing and similar products, has announced the election of A. G. Bussmann as Vice President in Charge of Sales, directing all sales and merchandising operations of the company and its subsidiaries. Mr. Bussmann has been associated with Wickwire Spencer since 1930, acting successively as Manager of the Wire and Springs Divisions, Sales Manager of the Buffalo District, General Sales Manager, and Assistant to the Executive Vice President. Most recently he has been Assistant to the President. He will continue to be located at the executive offices in New York.

## CONNERY'S HEATING KETTLES



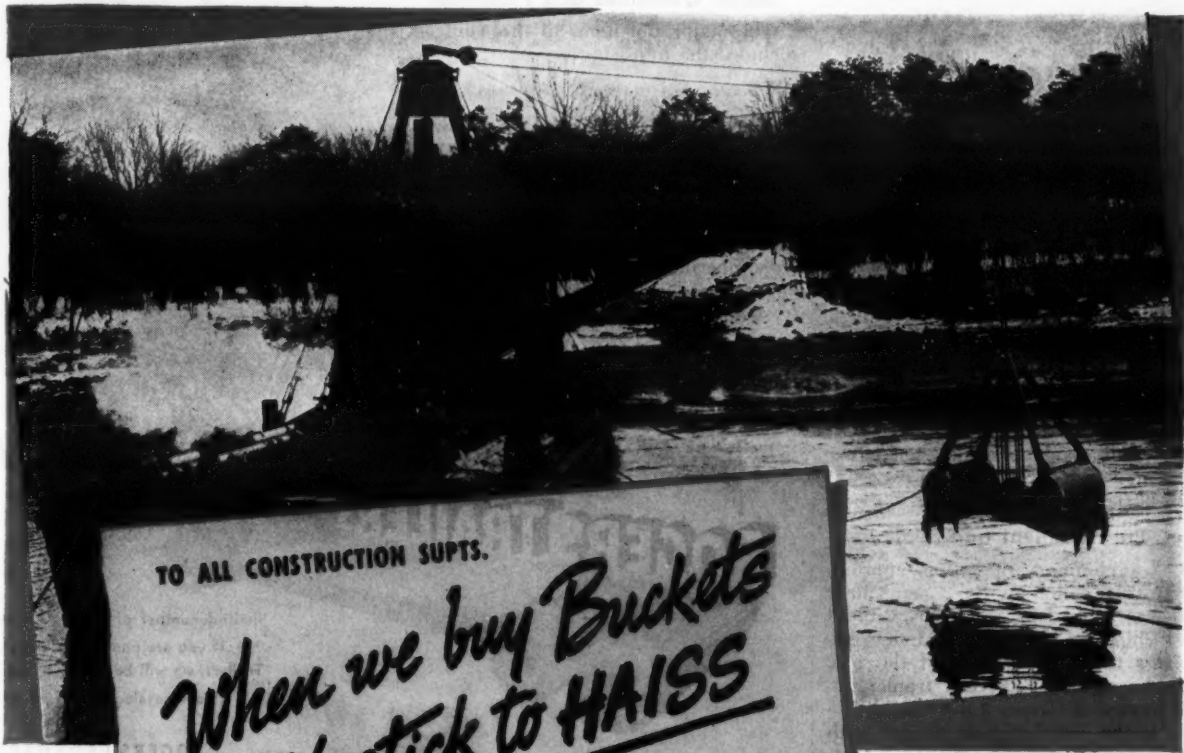
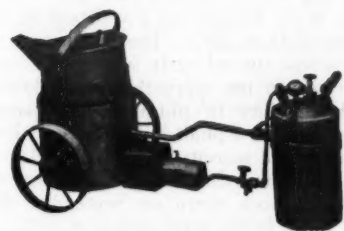
Speed up work by using a Connery Heating Kettle for building and maintaining highways, airports, barracks and roads. Made in sizes of 30, 80, 110 and 165 gallons.

Send today for our complete catalog showing our full line of Tar and Asphalt Heating Kettles, Spraying Attachments, Pouring Pots, etc.

## CONNERY CONSTRUCTION CO.

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TO ALL CONSTRUCTION SUPTS.

*When we buy Buckets  
let's stick to HAISS*

More and more contractors are coming to say just that, "Let's stick to Haiss"... It comes when they've discovered that a Haiss Clamshell handles bigger payloads—by total yardage per day, month or year. The "plus" in yardage-handling efficiency is the natural result of a combination of design advantages. And the stand-up ability that keeps a Haiss at top efficiency through a long life... Catalog No. 143 on Hi-Power Digging Buckets—No. 343 on "Multi-Sheave" Rehandlers.

GEORGE HAISS MFG. CO., INC., Canal Place & E. 142nd St., New York 51, N.Y.

HI-POWER  
for DiggingHighest  
Closing  
Ratio  
(up to 7:1)Lower  
Sheaves  
up out of  
the muck

Heaviest Jaws of any bucket of its kind

"Multi-Sheave"  
Rehandler

HI-POWER

CLAMSHELL BUCKETS • LOADERS • PORTABLE CONVEYORS



## Trials on Contract Sealing in Wyoming

Section of U. S. 287 East of Dubois  
Repaired: Wartime Shortages of  
Parts and Labor Delay Job

FOLLOWING a wartime policy of seal-coat application by contract, in the spring of 1944 the Wyoming State Highway Department awarded a contract to the Big Horn Construction Co., Sheridan, Wyo., for placing a seal coat on 45 miles of U. S. 287. The production of chips was started early in the construction season but equipment breakdowns with inability to obtain repair parts, shortages of asphalt for delivery when desired, and scarcity of labor so delayed the contractor that he was permitted to shut the work down on September 20, and finish in the early spring of 1945.

The grading of the chips used on this project was:

Size (Square Opening)	Per Cent Passing
5/8-inch	100
3/4-inch	95-100
No. 4	0-10
No. 10	0-5

Material almost meeting this specification, with the exception of some excess of both oversize and fine material, was available at a number of gravel deposits close to the job and three of these pits were selected in order to equalize the haul. Since in these pits only about 25 per cent of the material is smaller than a No. 10, and only about 10 per cent larger than the maximum size permitted, the production operation consisted of crushing, loading, screening, and hauling to stockpiles located about 8 miles apart along the job. This operation was started soon after the award of the contract and all production and stockpiling were completed before the job was shut down in the autumn of 1944.

### Pre-Treatment and Seal

As a preliminary operation, approximately 0.12 gallon of RC-2 per square yard was applied 22 feet wide, without cover chips, on the 24 to 26-foot roadway for the entire length of the job. Asphalt was hauled directly from refineries located at Casper a distance of 175 miles to the distributor on the job with so little loss of temperature that job heating was not necessary. Approximately two weeks later, when the preliminary treatment had cured sufficiently, an ap-

plication of 0.27 to 0.33 gallon of RC-3 per square yard and 20 pounds of the cover chips was made to one half the road at a time, with the shots alternated from side to side to keep the progress approximately equalized.

Paid for by weight, the chips were loaded from the stockpiles by mechanical loaders, with a pitless scale moved from stockpile to stockpile with the operation. The chips were placed on the road by a 10-foot Buckeye spreader.

Although usual production on this type of work averages 3 miles per day, this particular contract was so adversely affected by shortages of hauling equipment and labor, as well as by breakdown of over-age equipment, that the average production secured was only about a mile per day. Approximately 30 per cent of the seal application had been completed by September 20 at which time low temperatures in the morning and late afternoon so reduced the available working day that it was considered inadvisable to attempt further work. The job was shut down until spring.

### Major Quantities and Personnel

The major bid items of this contract included the following:

Stone chips	5,500 tons
Prime seal coat, RC-2	210 tons
Seal coat, RC-3	915 tons

The contract for this seal-coat application on 45 miles of U. S. 287 was awarded to the Big Horn Construction Co., Sheridan, Wyo., on its low bid of \$41,000 in May, 1944, by the Wyoming State Highway Department, J. R. Bromley, Superintendent. Seventy working days were allowed for completion. M. H. Archabald was Superintendent for the contractor, and Orren Bower was Resident Engineer for the Wyoming State Highway Department.

## Equipment Costs Up With Revenue Less

The current biennial report of the Idaho Department of Public Works for 1943-44 shows that the requirements for equipment purchases and highway maintenance increased while the revenue for gasoline taxes was \$2,000,000 less than

during the 1941-42 biennium.

Idaho reports that it has plans for post-war highway projects to the extent of about \$4,000,000. It is working in collaboration with local government agencies to develop further plans which will equitably distribute the benefits and financial responsibility among Federal, state, and local units of government.

## BROWNHOIST BUCKETS



The greedy jaws of Brownhoist clamshell buckets speed up material handling in dirt, clay, coal, gravel and ore. Their deep, clean bites practically eliminate hand shoveling. Extra sturdy. Large sheaves reduce rope wear to a minimum. AVAILABLE IN ROPE-REEVE, POWER-WHEEL AND LINK-TYPE. For facts and prices write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.



## — ARE AGAIN — AVAILABLE

IMPROVED methods and expanding facilities have increased our production to a point that meets continuing military demands and enables us to supply a limited number of trailers for commercial use.

If you are one of the many contractors or riggers who have wanted Rogers Trailers, we will be happy to go into the matter with you.

If our catalog will be of interest, we'll be glad to send it to you.

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ALBION, PENNA.

EXPERIENCE  
Builds 'em

PERFORMANCE  
Sells 'em

## LINKS REPLACED in 6 MINUTES... on LOMBARD'S POWER CHAIN SAW

THAT'S SPEED! Six minutes is all it takes to change damaged chain links on Lombard's new portable power chain saw—the 42 lb. "babe in the woods" that does the work of 10 men.

No valuable time lost! Just remove helper's end of saw, release chain tensioner, unhook the damaged link, hook in a new one, set chain tension adjuster, put on helper's end. Presto—the sturdy Lombard air-driven chain saw is back at work. And get this—the Lombard saw will slice through standing timber within two inches of the ground. That means more wood, more profits for you. The Lombard Air Saw is adaptable, too—it cuts equally well under water.

It's the NEW LIGHTWEIGHT CHAMPION—the air model weighs only 42 pounds, 5 to 15 pounds lighter than anything else on the market. Prompt delivery can be made on the 24-inch air model, which operates from a standard 105 cu. ft. compressor.

A powerful electric job is available in 3 HP, 60 cycle, 220 volt, 24" and 36" cutting blades. Illustrated literature on modern Lombard saw will be sent on request. Write today!



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**HOTEL  
WISCONSIN**



## Flood-Torn Bridge Rebuilt in Illinois

Two Piers Replace Three Pile Bents of an I-Beam-And-Concrete Structure; Novel Methods Used

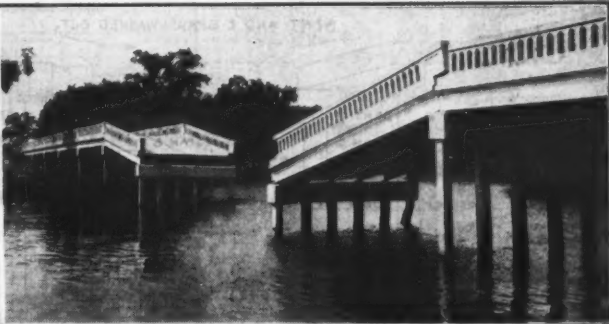
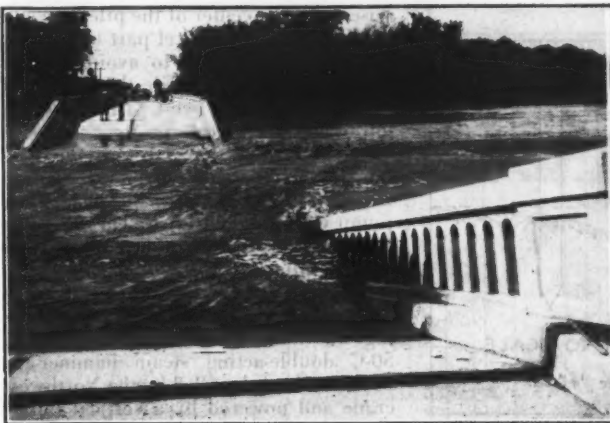
RECONSTRUCTION of a flood-damaged bridge over Wolf Lake on Illinois 78 just north of Chandlerville in Mason County was completed late in 1944. The work consisted of constructing six spans having a total length of 261 feet. In the spring floods of 1943, an upstream river levee on the Sangamon gave way, causing the river to overflow its banks and turn the placid waters of the lake, which is really a backwater of the river, into a deep raging torrent. On May 19, 1943, the water rose 13 feet from the normal elevation of 448 to the unprecedented height of 461 to lap at the very deck beams of the bridge.

The structure might have successfully resisted the action of the water itself but the rushing stream tearing across country possessed great earth-moving power. The normal bed of the lake was at elevation 440 but the water gouged out a new and deeper channel to elevation 405 just south of the center of the span, washing out one of the twelve 6-pile bents of the bridge and taking two spans along with it. In addition, the flood undermined the two adjoining bents, causing them to drop in a vertical plane, lowering one end of the spans they were supporting and causing a break at the other end.

The ten-year-old bridge was 481 feet 6 inches long from center to center of abutments, being made up of eleven 43-foot 6-inch spans which rested on concrete caps topping the concrete piles. The deck was a 6½-inch concrete slab supported on I-beams.

### New Substructure Design

Although the water subsided rapidly after its damaging outburst, due to scouring there was still 35 feet of water where there had been only 8 feet before. Some silt had flowed into this channel but not enough to fill it up appreciably. Consequently the reconstruction of the bridge had to be in the nature of an im-



Wolf Lake Bridge on Illinois 78, north of Chandlerville, during the spring flood of 1943, at left, and above, immediately after the waters had subsided from an unprecedented height of 13 feet above normal, showing the damage at bents 7 and 9, which were undermined, and the location of the two missing spans.

provement to the substructure. The piling in the two bents adjoining the bent that had completely gone was pulled and redriven to strengthen the next two bents back. In place of these three bents, two piers with greater spans between were built and the deck reconstructed over the former 6-span length.

When the flood waters had abated, the Maintenance Department of the Illinois Division of Highways built an 18-foot crushed-stone road around the eastern shore of Wolf Lake and crossed the inlet at the northeast corner with a wooden bridge having three 15-foot spans supported on pile bents. With traffic pro-

vided for, construction on the improvement was begun in January, 1944, by the Eric Bolander Construction Co. of Libertyville, Ill.

### Contractor's Problem

An interesting situation faced the con- (Continued on next page)

# power...



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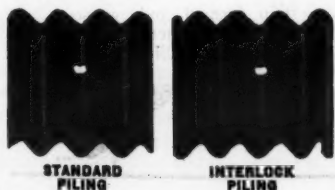
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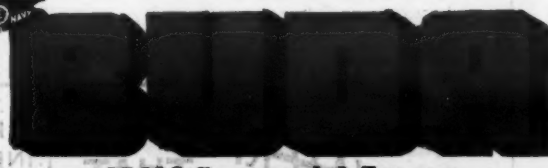


**CAINE STEEL CO.**

1820 No. Central Ave., Chicago 39, Ill.



BUDA Nozzle Testers

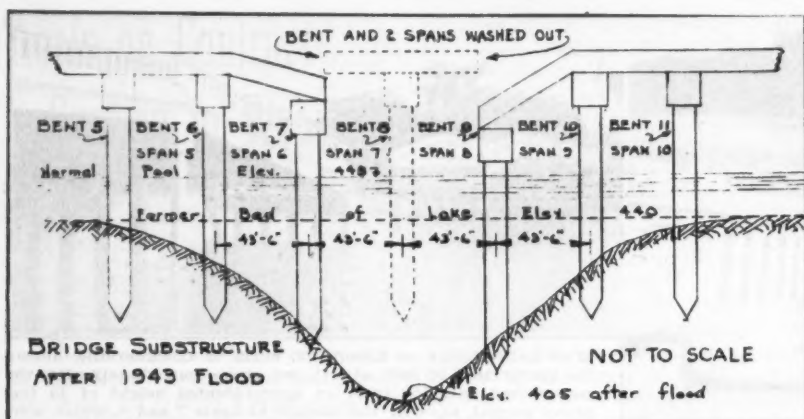


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BUDA "All-Purpose" Jacks





## Bridge Rebuilt

(Continued from preceding page)

tractor at the start of the reconstruction. Bent 8 and adjoining spans 7 and 8 were gone, sunk in the deep waters of the lake; the next two spans, 6 and 9, were sloping towards the open water at the gap in the bridge. Bent 9 had sunk about 10 feet from its normal position, while bent 7 had dropped about 7 feet. The pile at the eastern end of bent 9 had cracked, but the remaining piles in the two bents were in good shape and, although undermined, the great weight of the piles had caused them to sink almost vertically into the lake bottom to find a deeper and stable footing.

As the first step in rebuilding, the concrete railing and deck on span 6 were broken up with jackhammers powered by a Schramm air compressor, and the I-beams removed for later use. The beams were handled by a Northwest crane with a 60-foot boom working from undamaged span 5. On top of the 3 x 3-foot concrete pile cap on sunken bent 7, a temporary concrete wall was constructed 2 feet thick at the cap, and about 15 inches thick at the top. This wall ran the length of the cap and was built to a height level with the caps of the remaining bents. The I-beams taken from the span were replaced at this new grade and used as stringers for timber sections laid on top of the steel. The crane was then moved out to the end of this built-up span to drive piles for the pier footings.

### New Piers

The center line of new pier 1 is 51

## THE FEATHER TOUCH



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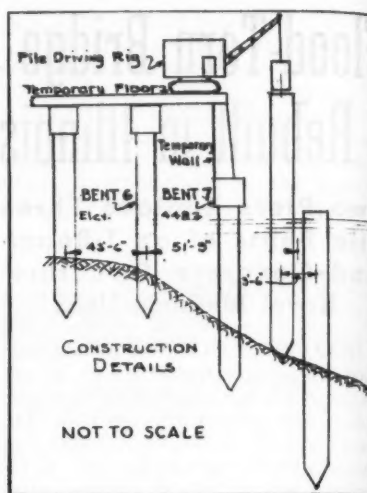
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feet 9 inches from the center of bent 6, but only 8 feet 3 inches from bent 7, which was removed later when the piers were completed. Piles for the pier footings are of reinforced concrete 18 inches square and average 58 feet in length. During the pouring of these piles a 2-inch iron jetting pipe was placed length-

wise down the center of the pile, one end coming out on the bevel part of the toe, just above the point, to avoid damage during the driving, while the other end made a 90-degree bend just below the top of the pile to emerge for an outside water-line connection. To speed the driving, water under pressure was delivered through this pipe by a Jaeger triplex pump with a 4-inch inlet. The pipe was later burned off close to the concrete and the hole plugged.

The piles were driven to cut-off grade and rest on rock at elevation 390. Driving was done by a Vulcan Super No. 50-C double-acting steam hammer in swinging leads handled by the Northwest crane and powered by a vertical boiler on skids. The piles are spaced 5 feet 2 inches on centers in double rows of six piles each, 3 feet 6 inches apart. They extend 2 feet into the pier footing which is 29 feet 8 inches long x 7 feet wide x 4 feet deep, and the bottom of which is at water level. Concreting for the footing and pier 1 itself, which is 14 feet high and 3 feet wide, was done by set-

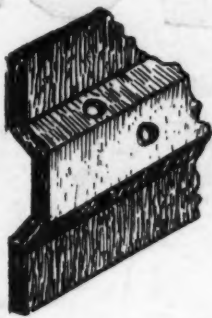


ting up a Rex 2-bag mixer in the same position that the crane occupied on the water side of span 6 and chuting the concrete down into the wooden forms.

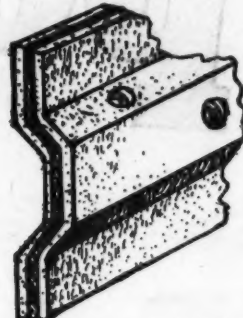
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## SERVICISED: CONTRACTION JOINTS DUMMY JOINTS

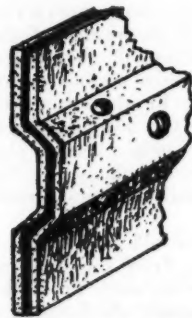
PATENT No. 2,370,153. OTHER PATENTS PENDING.



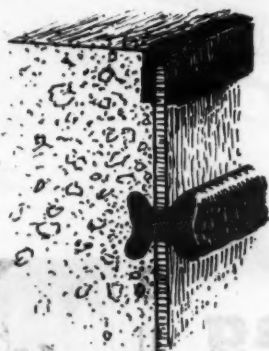
A rigid mastic joint with waterproofing paper sides, punched for dowels and staking. Also prepared with Para-Plastic for better waterproofing of the crevice.



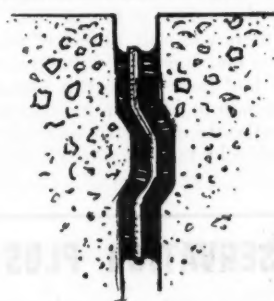
A wood veneer core for interlocking of slabs having felt sides cemented thereto with Para-Plastic which upon oozing will waterproof the top and bottom of the center strip.



Light steel center strip faced on either side with Para-Plastic and felt sides. Sufficient coverage of material to cause slight oozing above and below the plate in order to cause the Para-Plastic to adhere to the walls of the concrete and waterproof the space above and below the joint.



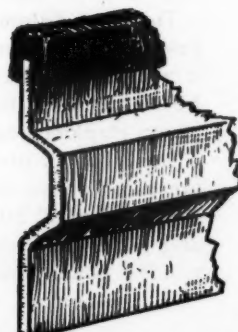
Special keying device formed of Para-Plastic mounted in place by rigid board and capped with Para-Plastic crown.



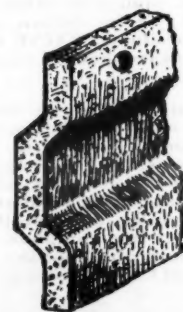
Steel center strip coated with Para-Plastic prior to laying in cement. Absolutely waterproofing the crevice in case of contraction.



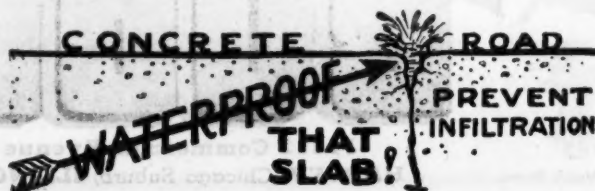
Asbestos cement tongue-and-groove strip prepared from the same material from which asbestos shingles are formed. Can be water-proofed or not as desired.



Economical steel center strip having less steel than ordinary. The top ridge having mounted thereon a Para-Plastic crown.



Center strip formed and pressed from sawdust, having synthetic resin binder. Can be water-proofed if desired.



**SERVICISED PRODUCTS CORP.**

6051 W. SIXTY-FIFTH STREET, CHICAGO 38, ILL.



## Bridge Rebuilt

(Continued from preceding page)

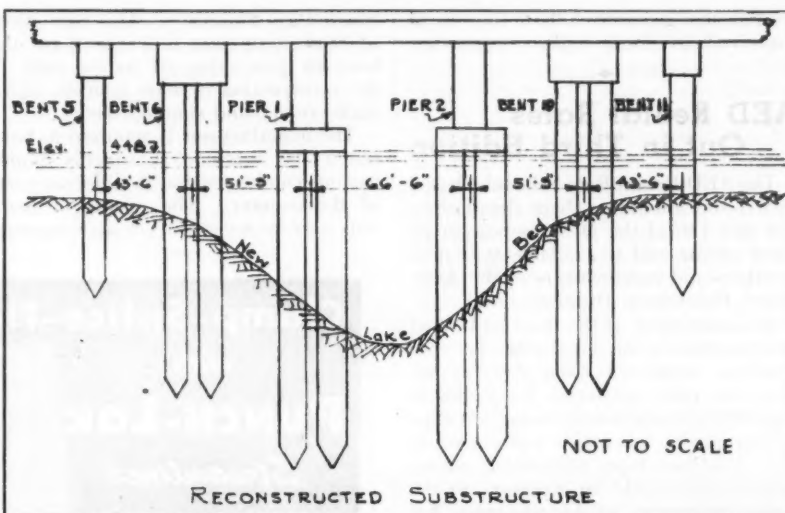
With pier 1 completed, the temporary wall which had been built on bent 7 was removed as was also the pile cap. The concrete railing and deck on span 5 were removed next and the steel covered with a temporary timber deck to support the crane. From a position near the south end of span 5, the crane pulled out the six sunken piles of bent 7, one of which was discarded and the remaining five were driven in a parallel row 2 feet on centers from the piles in bent 6. Spacing in both the original row of six piles and the new row of five piles is at 5 feet 2 inches but the new row is staggered with relation to the original piles. The old pile cap was removed and all eleven piles were driven deeper and then extended as much as 17 feet to meet the existing grade of the bridge. A new pile cap, 26 feet 11 inches long x 4 feet 6 inches wide x 4 feet deep, was then built over the double row of piles which extend 2 feet into the cap.

### Symmetrical Repairs

As the damage to the bridge was practically symmetrical about the washed-out bent 8, repairs at the other end were similar to those already described with the exception that pier 2 is slightly higher than pier 1, being 15 feet 3 inches from the bottom of the footing to the top of the pier. The reconstructed substructure of the bridge is now made up of two concrete piers spaced 66 feet 6 inches apart on centers, flanked on each side by the double-row pile bents 51 feet 9 inches away.

These gaps were next bridged by a three-span continuous I-beam deck 170 feet center to center of end bearings, fixed at pier 2 but movable at pier 1 on rollers 1 foot 2 1/4 inches long x 4 inches in diameter. The steel which had been removed from spans 5 and 10 while the bents were being rebuilt was replaced by the crane. As the first span was completed, timbers were placed across the beams and the crane was moved out to the far end to lay the steel for the next span. The material used was the old steel that could be salvaged, and new beams to replace those which were lost.

The two outside stringers are 24-inch 85-pound I-beams while the four inner stringers are 24-inch 100-pound I-beams, all spaced 4 feet 9 inches center to center. Rivets are 3/4-inch with 13/16-inch round holes. Cross bracing over the pier span consists of three 10-inch wide-flange (WF) 33-pound I-beams spaced at 33 feet 3 inches. The adjoining 51-foot 9-inch span is cross-braced as follows: 24 feet 8 inches from the pier is an 18-inch 47-pound I-beam; 14 feet 5 1/2 inches further is a similar section; while 12 feet 7 1/2 inches more, and over the double-row bent, there is a 14-inch WF 30-pound I-beam. The rest of the stringers are cross-braced with 18-inch 47-pound I-beams spaced 14 feet



6 inches between centers.

A 6 1/2-inch reinforced-concrete floor 22 feet wide, having a center crown of 1 5/8 inches, was laid over the 261 feet

of new bridge. Floor drains, 6 x 4 inches, spaced at 12 feet were placed along the curb on both sides. The largest pour was 112 cubic yards which covered the

three longest spans. A 4-foot 8-inch concrete railing to match that on the rest of the bridge was the final touch.

### Major Quantities

The contract price on the reconstruction of the Wolf Lake bridge, which was opened to traffic in December, 1944, was \$60,778. The major quantities on the project were:

Concrete	303 cu. yds.
Reinforcing bars	41,750 lbs.
Structural steel, old	114,540 lbs.
Structural steel, new	72,320 lbs.
Concrete piles	1,464 lin. ft.
Riprap	690 tons
Concrete removal	177 cu. yds.
Extension to old piles	344 lin. ft.

### Personnel

This bridge reconstruction was done for the Illinois Division of Highways, Wesley W. Polk, Chief Engineer, in District 6 of which Carl M. Wahl is District Engineer, with headquarters at Springfield. John Langer was Superintendent for the Eric Bolander Construction Co. of Libertyville, Ill., which employed an average of 12 men on this contract.

# HOW TO DRILL

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**ON JOBS** that you would ordinarily do with hand-held drills you'll get more footage and get it faster with less manpower by using Sullivan "Lightweight" Wagon Drills. All the burden of drilling is taken from the arms of the operator and put on an independent air motor and feed-chain which provide an even, continuous and greater pressure on drill bit. One man operating a 75 lb. drill on a Sullivan LIGHTWEIGHT will drill as much footage as two men each using a 55 lb. hand-held drill.

Pneumatic-tired wheels make them easy to handle. Simple, rugged, positive-locking brakes eliminate anchor pins and reduce set-up delays leaving more time for actual drilling.

The Sullivan diesel-powered, 210-cubic foot, two-stage, "plus portable" shown is typical of the portable compressors which are supplying air power for operating Sullivan wagon drills, hand-held drills, paving breakers, spaders, trench diggers, sheeting drivers, plug drills and other Sullivan contractors' tools. They contain all the features that only Sullivan can give you: two-stage compression, ball main bearings, controlled air cooling, super intercooling, micro lift valves that last six to eight times longer, and forced lubrication that reaches every bearing and working surface.

Ask your Sullivan representative for bulletins on wagon drills and portable compressors, for details on how they save manpower, time and maintenance. There's a representative in every principal city.

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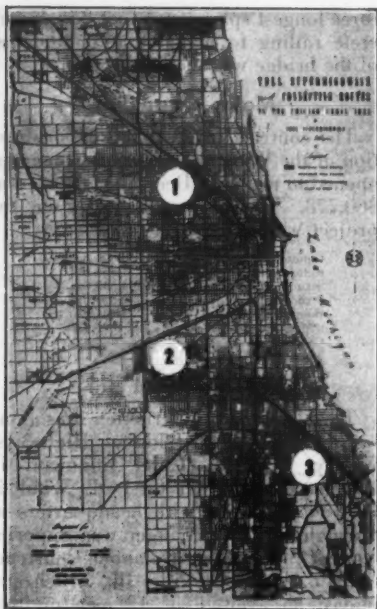
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Proposed toll expressways and connecting routes in the Chicago urban area.

### Tolls Would Finance Chicago Expressways

A plan has been outlined by the Illinois State Superhighway Commission to provide Chicago with a network of 50.2 miles of expressways upon which no stoplight or intersection would retard the flow of traffic between the Loop and the North, South, and West Sides. One section of this project, the northwest route, would be 11.6 miles in length, which would cost \$57,992,000, and be paid for over the recommended 30-year financing period by a 25-cent toll.

The suggested highways, shown on the accompanying map, would parallel the Chicago & North Western Railway tracks in the northwest route (1), the abandoned Illinois & Michigan Canal in the southwest route (2), and (3), diverging from Halsted St., would follow the railroad tracks paralleling South Chicago Ave., to 106th St. and Indianapolis Ave.

An appropriation by the Illinois Legislature is being sought to meet the cost of preliminary plans and make possible the underwriting and issuance of bonds for the immediate post-war construction of the northwest route. John J. Schommer is Chairman of the Illinois State Superhighway Commission, and V. B. Steinbaugh is President of Allied Engineers, Inc., of Detroit, which has spent 4½ months studying the project. The

present plan generally follows the system conceived by local highway agencies.

### AED Rental Rates Out in Third Edition

The AED Rental Rate Schedule, based entirely on Maximum Price Regulations 134 and 136 of the OPA, is now in its third edition and is available at cost to members and non-members of the Associated Equipment Distributors.

Announcement of the third edition of this compilation of rental rates for construction equipment states that "an aspirin for price quotation headaches is supplied by a schedule arrangement classifying prices for major equipment in large bold-face type, with minor equipment, which would be accessory to the major equipment, set directly below but in a type size and face that makes it easily distinguishable from the major equipment item". In this way a dealer quoting prices on tractors with certain accessories, or an air compressor with hose, jackhammer, paving breaker, and steel drills, no longer has to turn to numerous pages in the OPA regulations or the old issues of the AED schedule to arrive at his overall rates.

The Green Book compilation of rental rates was prepared by the Rental Committee of the Associated Equipment Distributors. A foreword by Eldon M. Farnum of St. Louis, Mo., Chairman of the Committee, states: "The Associated Equipment Distributors, through their officers and the Rental Committee, have endeavored to assist the Office of Price Administration in their very thorough examination of the rental rates throughout the country. That office has expressed its appreciation of our efforts. We shall continue to extend any assistance to the Office of Price Administration that may be required of us".

Copies of this book of rental rates may be secured direct from AED headquarters, National Press Bldg., Washington 4, D.C., at \$2.00 per copy.

### New Unit Developed For Soil Stabilization

A new machine for soil stabilization, said to combine in one operation all the necessary functions in soil preparation, has been developed by Harnischfeger Corp., 4419 W. National Ave., Milwaukee 14, Wis., to be known as the P&H

Single-Pass Stabilizer. This new piece of road equipment is designed for the low-cost processing of native soils in the construction of base courses, light-traffic roads, and similar jobs.

The manufacturer is reported to have tested the machine thoroughly under various conditions and in different parts of the country. The results of these tests may be secured from the company.

### Hyster Chairman Dies

Amedee M. Smith, pioneer west-coast industrialist, died March 25 in Portland, Ore., at the age of 76. Mr. Smith was Chairman of the Board of Directors of the Hyster Co. of Portland and Peoria, Ill., and President of the Willamette Iron & Steel Co. and several other enterprises. He was also active in civic affairs.

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## How to Sink Piles By Jetting Process

The use of a stream of water under pressure to jet piles into place is not a new discovery, but usually special equipment has been required. The development of the LaBour Type SFI pump delivering 50 gallons per minute provides all the water needed for most jetting purposes, besides having many other uses. The pump delivers the water under 60-pound pressure, equivalent to a column of fresh water nearly 140 feet high. Powered by a gasoline engine, the unit is readily portable by two men, or it may be bolted to deck or dock.

The LaBour Co., Inc., Elkhart, Ind., has issued a new bulletin No. 52 "How to Sink Piles Without a Pile Driver" which discusses the whole process, shows a job under way, and gives diagrammatic details of a typical jetting unit. Copies of this bulletin may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to the manufacturer.

## Virginia Road System Was Started in 1657

Virginia's first real effort to establish a system of roads dates back to 1657 when the General Assembly decreed that "Surveyors of highways and mainte-

nance of bridges be yearly kept and appointed in each county court respectively; and that all general ways from county to county and all churchwaies to be laid and cleared yearly as each county court shall think fit, needful and convenient, respect being had to the course used in England to that end".

In 1661 an act was passed requiring roads to be made "forty foote broad". The first definite routing of a major road was in 1691 between Richmond and Fredericksburg, along the present location of U.S. 1, J. J. Forrer, Maintenance Engineer, Virginia Department of Highways, reports in a paper, "Colonial Roads in Virginia".

Virginia's present state highway sys-

tem was established by an act of 1918 and has grown from the original 4,002 miles to 9,438 miles. The state secondary system was created in 1932.

## Dresser Industries Moves to Cleveland

The administrative offices of Dresser Industries, Inc., formerly of Bradford, Pa., have been established at 1130 Terminal Tower, Cleveland, Ohio. In addition to providing the most efficient facilities for the company's personnel, it is felt that this centralization of headquarters will reduce executive travel time to the eighteen plants of the corporation's thirteen member companies.



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When gasoline rationing becomes a memory and the call of the open road can be answered, the new and improved highways that must be built through remote vacationlands will provide many profitable jobs for contractors with the proper equipment. In the Cedarapids line of portable plants there is just the size and type to fit every aggregate production requirement. The Junior Tandem is a typical example, has plenty of belt capacity to handle all kinds of pit conditions, ample extra screen capacity for those tougher screening jobs, and the extra secondary crushing capacity for the production of either fine or coarse aggregate. The entire plant is mounted on one steel truck chassis equipped with pneumatic tires, ready to move to the mountains, parks, or forests from one job to another. Let your Iowa dealer tell you about the profit opportunities you can have with Cedarapids equipment.

**IOWA MANUFACTURING COMPANY**  
Cedar Rapids, Iowa



## C&EMonthly Review Of Its First 25 Years

(Continued from page 1)

named "Contractors' and Engineers' Purchasing Guide", we gave to the reader in our "Where to Purchase Directory" the name of every manufacturer or producer in the field, and our Advertising Department offered every manufacturer an opportunity to reinforce his listing with display advertising.

Another real step forward was the decision, at the request of contractors, to name the machine doing the job. As one contractor put it, "I want to know the make of machine the other fellow is using so I can see if I'm stuck with a bum shovel or a lazy operator." This leadership in "telling all" has been generally accepted since then by the progressive technical press.

In February, 1921, we changed our name (no, it was not a marriage with some other publication) to the present **CONTRACTORS AND ENGINEERS MONTHLY**, and in August, 1927, the old purchasing directory passed out of the book because construction men had become more interested in the live news descriptions of new equipment which had already become a feature of the magazine than in mere listings of all manufacturers of any one type of equipment.

Beside the big 14 x 9 3/4-inch type page of today, the 8 x 5 1/4-inch page of 1920-27 looks like a vest-pocket edition. In that time the front cover had been transformed from an advertising page into a distinctive pictorial feature. In 1928, the page size was stepped up to the well known 7 x 10-inch dimension and so remained until 1935 when the January issue blossomed forth in the present size and newspaper make-up, with headlines and subtitles accurately describing the articles so that the busy contractor and engineer can "take it or leave it", as his business interests are inclined. This latter change put the editorial material right out in the front of the book and eliminated a cover. The association of editorial text and advertising on all but feature editorial pages provided a challenge, as construction men read "ads" as diligently as they search editorial text for new ideas.

Service to the reader has been the fundamental editorial policy from the very beginning. This responsibility we have taken seriously, because no publication which fails in serving the reader first and always, so that he seeks its editorial and advertising pages with interest and faith, can continue successfully.

### In the Early Days

Although our twenty-five years of publishing does not go back to the wheelbarrow age of levee construction, our early issues contained data on the extent of service from horses and mules. In an article "The Economy and Field of the Horse-Drawn Wagon" by Wayne Dinsmore, Secretary, Horse Association of America, Chicago, Ill., appears the following report from C. W. Blakeslee & Sons, Inc., New Haven, Conn., a contracting organization which celebrated its 100th birthday last year:

"The immensely cheaper cost of horse equipment, slower depreciation, and smaller operating cost put the motor truck in a luxury class, except for long-distance hauling where the roads and other conditions are favorable. The almost prohibitive cost of really good 5-ton motor trucks, with the certainty of heavy tire, gas, and repair expense, is sufficient reason for our using but three motor trucks of our own, as compared with our 200 horses. For any extra or special work, we can hire as many motor trucks as we need at a lower rate than we can afford to own and operate them. Motor trucks on long-haul work can only be used with profit when there is

little delay in loading and unloading them. There are a good many conditions under which we can operate horse-drawn vehicles where a motor vehicle is not able to make any headway; for instance, in making fills across a deep ravine or any place of that kind, we can send teams out on the dump where a truck would frequently sink to the hubs."

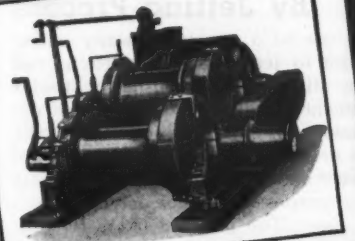
A letter received last month from Albert D. Blakeslee, Secretary of this same contracting organization, states, "Of course, things have changed greatly since then, and I personally feel that one of the things that has made the motor truck usable on construction work is the pneumatic tire. With pneumatics a motor truck can go and do many things that were not feasible with solid tires. At present, we are operating sixty-eight of our own trucks of various types and sizes and frequently hire a few, five to ten, to supplement our fleet." And no horses!

Volume 1, No. 1 contained an article on the industrial railway in concrete paving and how machines were replaced.

(Continued on next page)

## Hoists to Fit the Job

Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency on the job. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire first of LIDGERWOOD.



**HOISTS FOR:**  
CABLEWAYS  
INDUSTRIAL PLANTS  
CONTRACTORS  
MINES—DOCKS  
RAILWAYS

**LIDGERWOOD**  
ESTABLISHED 1873

Manufacturing Company  
MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY

## HOW YOU PROFIT BY

B  
G

# Pre-Engineering

• Here's a factory-built conveyor system that will fit your custom-built plant completely!

No special engineering. No delay for estimates on cost. No weeks of waiting for factory fabrication. Barber-Greene Conveyors are pre-engineered—pre-fabricated!

B-G Conveyors are built in a variety of sizes, forms and capacities, that they'll meet any material handling requirement . . . can be installed anywhere.

Erection costs? Your own workmen can install a B-G Conveyor system quickly, easily. Units arrive on the job conveniently marked. Factory assembled terminals and standardized units simplify and speed erection.

Barber-Greene Conveyors are standardized. You can make additions and alterations rapidly . . . move it to a new location with 100% salvage. Factory assembly assures correct alignment in erection—reduces belt wear and maintenance expense. Write for Catalog 76. Barber-Greene Company, Aurora, Illinois.

**Barber-Greene** B G Constant Flow Equipment





## C&EMonthly Review Of Its First 25 Years

(Continued from preceding page)

ing men in construction. Every volume from then on traces the history of equipment development in short specific items on the machines themselves and articles on their use. The industrial railway, for example, gave way to truck haulage, as pneumatic tires increased the adaptability of trucks to greater varieties of work; the steam-driven paver was succeeded by gasoline and diesel-powered units; tandem pavers appeared and were then pushed aside by the double-drum and 34-E's; and improved batching plants have kept pace with the demands of the ever hungry pavers.

The disposal of surplus equipment was a problem in 1920, as it is today, and was discussed in May, 1920, under the title "Distributing the Surplus Army Motor Trucks". The method then was to give away trucks to governmental units, and it has been less than a decade since most state and county departments were rid of the last of those white elephants of World War I. Present methods of selling surplus equipment to authorized dealers will prevent overloading our highway departments with obsolete equipment, or trucks not adapted to highway work.

One more "starter" in May, 1920, was the complete roster of the newly organized Associated General Contractors of America, listing 444 members. Founded on the bedrock principles of service, with "Skill, Integrity and Responsibility" as its motto, the AGC has grown to be the outstanding contractor association in this or any country.

Even in 1921, they used "pushers" and "pullers" to load the scrapers of that day. In the September, 1921, issue is an article on the use of self-loading Baker-Maney scrapers for grading, with illustrations showing a gasoline hoist being used to pull a horse-drawn scraper during loading and another showing an early crawler tractor hitched ahead of the horses to permit "taking on a full (1-yard) load of compacted dirt".

### Covering the Road Shows

Perhaps the answer to "Where shall we find a place big enough to house the ARBA Road Show after the war?" is really found in the series of outdoor road shows in North Carolina in 1924, New England in 1925, 1926, 1927, and 1928, and the All-Western Shows in San Francisco in 1925 and 1926 and the Los Angeles Show of 1928. Huge tents, vast acreage where equipment can show its stuff, and perhaps a Pullman City to house the visitors, may solve the problem. CONTRACTORS AND ENGINEERS MONTHLY told the stories of those grand open-air road shows in word and picture.

The Road Show in conjunction with the American Road Builders' Association Convention has been the big event in the highway construction industry since 1909. The C&EMONTHLY staff has regularly covered these Shows since 1920, to keep in touch with the newest equipment developments and bring announcements of them to our readers.

When peace once more makes possible another Road Show, our enlarged staff will be on deck for a first-hand report of the many new developments which will result from the greatly accelerated technological progress during the war.

### Some Highlights

We recognized the revolutionary influence of the diesel engine in the construction equipment field at an early date, and in May, 1930, on page 67, published an article by a contractor on just what the diesel contributed to his work. Then in January, 1931, on page 69, is the first comprehensive discussion of the subject "Diesel Engines on Construction Work".

We felt from the start that care of equipment was important, but in 1934 our first series of articles on that subject appeared, featuring lubrication. These twelve articles covered the why of lubrication, types of lubricants, and the proper lubrication of prime movers and construction equipment. Since that date, and particularly during the past four

years which have been a period of scarcity of new equipment, our articles on the care of various types of equipment have been a constant source of help to contractors and highway departments alike.

The Pennsylvania Turnpike was the subject of a series of fourteen articles starting in December, 1939, with an article on the conception and design of this outstanding expressway toll road, con-

tinuing with articles on selected construction contracts for grading, bridges, the Allegheny and Laurel Hill tunnels, concrete paving, and ending with a report of the Editor's inspection trip over the full length of the project a few weeks before it was opened for service.

In addition to many practical articles on the construction features of the Bureau of Reclamation's Boulder, Bonne-

(Continued on next page)

Engines FROM 90 to 215 HP. Generators FROM 60 to 115 KW


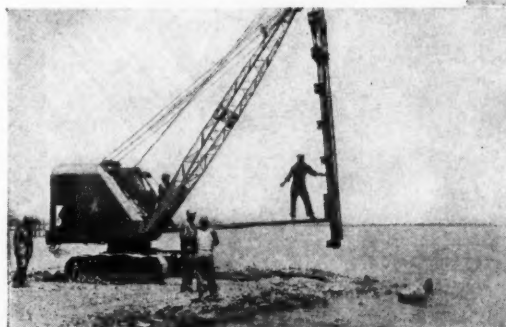
More Power  
**MURPHY DIESEL**  
More Profit



**MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.**

# JACK OF ALL JOBS-

in heavy materials handling

Osgood "20" driving piles for a landing pier in North Africa.



Helping to clear the way to Berlin and Victory, "Fighting Osgoods" serve under fire with Army Engineers in Europe, as well as on other battle fronts.

Above—Vital supplies and equipment being unloaded by a "Fighting Osgood Mobilcrane" in the South Pacific.

### "FIGHTING OSGOODS" LIFT, DIG AND DRIVE IN THE BATTLE OF SUPPLY

When the engineer troops and SeaBees "go in" on the heels of our attacking forces, they need the right equipment to do a multitude of jobs quickly and efficiently. Roads and air fields must be leveled, loading docks built, supplies loaded and unloaded, rubble cleared away fast.

Osgood shovels and cranes figure dependably in all these operations . . . working as crane, pile driver and shovel. They're engineered with the power, stamina and versatility to keep precision planning and production on schedule. You'll appreciate these advantages when your planning goes into action after Victory.

WHEN IT'S WAR BONDS, BUY MORE THAN BEFORE!

**SAVE 50% ON FUEL AND WAITING TIME**  
when Heating & Melting Tar & Asphalt

USE THE FAMOUS **HEET-MASTER**  
AEROIL BURNER CO., INC.  
5775 Park Avenue, West New York, N. J.  
Chicago 16 San Francisco 7 Dallas 1

THE **GENERAL** EXCAVATOR COMPANY  
CRANES, DRAGLINES AND SHOVELS  
DIESEL, GAS, ELECTRIC

Associated with The General Excavator Company

**OSGOOD**  
THE OSGOOD COMPANY • MARION, OHIO

**OSGOOD**  
SHOVELS, DRAGLINES  
CRANES



## C&EMonthly Review Of Its First 25 Years

(Continued from preceding page)

ville, Shasta, and Friant Dams, as well as Norris, Guntersville, and Pickwick Dams of the TVA, there was a series on five of the U. S. Engineer Department flood-control dams of the Muskingum Project in Ohio. Dams, as well as dredging, have been two subjects in heavy construction that have been productive of many articles built to specification for the reader.

Also in the field of heavy construction, issues of C&EMONTHLY have, through the years, kept our readers informed of the newest equipment and methods of construction in the ever continuing battle against floods along the Mississippi. Starting in 1929, when our first series of levee articles appeared, periodic visits by our Editors to the scene of operations have produced practical down-to-earth informative articles on this important phase of our national public works. Just starting in this issue is a new series of eleven articles on the wartime work being done by the U. S. Engineers and contractors to keep Ol' Man River in check.

With the exception of such outstanding projects as the Pennsylvania Turnpike and the Merritt Parkway in Connecticut, highway construction is less spectacular than many heavy-construction projects. We feel that our achievements in this field lie in the regular on-the-job reporting of the typical grading, concrete and bituminous paving, and culvert and bridge projects all over the country which have brought this nation's highway system to the best in the world. Hand-in-hand with highway construction goes highway maintenance, and to this latter subject we have, in the past four years, given increasing attention and more and more space, because of its importance in the war effort.

### A Little Pioneering

Our endeavor to stimulate improvement in the methods and details of asphalt construction was first mentioned editorially in 1926 and then restated in June, 1935, as follows: "It was prophesied nearly a decade ago that when highway officials and the manufacturers of asphalt paving equipment wrote specifications and built machines that produced pavements as smooth as the more expensive types, then bituminous paving would receive the recognition of the public." A by-product of our program to spread information on low-cost and high-type asphalt construction, both on highways and at airports, and the set-up and operation of asphalt plants will be found in the record of abstracts of our articles in the "Quarterly Digest of Asphalt Literature" published by The Asphalt Institute. Between January, 1938, when the Digest first appeared, and the end of 1944, a total of 178 abstracts of articles on asphalt construction or equipment from CONTRACTORS AND ENGINEERS MONTHLY appeared in the Quarterly Digest. The next ranking publication had but 91 abstracts and the third but 69.

We have also followed closely the growth of roadside development from its era of "pansy planting" and "roadside beautification" to its present practical operations in erosion control, slope stabilization, roadside naturalization, and the acceptance of the roadside-development engineer or landscape engineer as an essential partner in reconnaissance, design, construction, and maintenance. In 1939 C&EMONTHLY instituted a series of Annual Sectional and National Awards for contractors who improved roadside-development practice through new methods or equipment or whose work was outstanding beyond the requirements of plans and specifica-

tions. Awards were made through 1942 when wartime restrictions reduced new highway construction to the vanishing point.

In his annual report for 1939, H. J. Neale, Landscape Engineer, Virginia Department of Highways, as Chairman of the Joint Committee on Roadside Development of the American Association of State Highway Officials and the Highway Research Board, in referring to contributions made by the trade press to roadside development, stated, "No doubt, the most outstanding contribution of the past year was by CONTRACTORS AND ENGINEERS MONTHLY in offering a trophy as a National Award for the contractor or his superintendent who made the greatest contribution towards roadside development in the United States during 1939. Supplementing this award they have offered four Sectional Awards. This has awakened the interest of the contractor to the higher ideals incident to a more finished appearance and protection of the roadsides, or what has previously been a typical 'no man's

land'. Not only have the contractors who have been nominated for these awards fulfilled their obligations to the states in adhering to the specifications and completing the same to the best of their ability, but they have provided an ancillary note that will redound to their credit in future years".

### Construction for War

During the great era of domestic con-

struction for our armed forces, the editorial pages of CONTRACTORS AND ENGINEERS MONTHLY were devoted almost entirely to practical methods articles showing how construction was handled at airfields, ordnance depots, on access roads, and other military projects. We regretted that during the early part of this period it was impossible for us to give our usual credit to the construction

(Concluded on next page)

## Plan NOW—for NEXT Winter DAVENPORT-FRINK SNO-PLOWS



ALL TYPES AND SIZES

—should be top choice in your desire for FASTER • SAFER • CLEANER Snow Removal. Whatever lies ahead, it's wise to determine your needs promptly and place orders EARLY. We'll cooperate with you in every way. Write us for Complete Information.

DAVENPORT BESLER CORPORATION

Made in Eastern U. S. A. by CARL H. FRINK.

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DAVENPORT, IOWA

1000 Islands, CLAYTON, NEW YORK

# AIR Does the Work AT A TOUCH OF THE FINGERS



## With MICHIGAN Fingertip Air Controls

Hour after hour—in gravel, sand, clay or rock—operators of Michigan Mobile Shovel-Cranes maintain peak production with a minimum of fatigue. Michigan's Air Controlled Clutches are fast, smooth, positive. No cumbersome levers to push and tug, no rods, toggles or joints to become stiff with grease and dirt. Michigan's Air

Controls are job-proven, both in civilian and in military use . . . . Unsurpassed operating speed and truck mobility, plus real stamina and balanced design, are combined in the shovel-crane that has proven "tops" in materials-handling.

3/8 yd. and 1/2 yd. shovels—convertible to crane, clam, dragline, trench hoe. 6, 10 and 12 ton cranes.

Ask for Bulletin CE-55

# MICHIGAN

POWER SHOVEL COMPANY  
BENTON HARBOR, MICHIGAN



## C&EMonthly Review Of Its First 25 Years

(Continued from preceding page)

organizations for the fine work they were doing, but censorship for national security prevented our publishing the location of a project, except in general terms, or the names of those active in its prosecution. Approval of our efforts by both the Army and the Navy came in the form of letters thanking us for spreading information regarding speedier methods of construction, and better organization among the contractors who did such a stellar job in building the facilities for training our military personnel.

### Post-War Planning

To plan or not to plan was a moot question in October, 1942, but we felt the industry should be apprised of the thought in the various segments of highway and heavy construction as well as other industries which offered a field for construction activity in the post-war period. Intensive work by the editorial staff brought to our readers in April, 1943, the first integrated study in the series which was published between April and November of that year. Since post-war plans must be for a post-war world, the initial article discussed governmental problems, international responsibilities, and the responsibilities of industry and of religion in establishing a rational post-war era.

The succeeding articles in this series analyzed and discussed: in May, the effect of a post-war road program on the national economy, highway planning based on future needs, and the development of roadsides in post-war plans; in June, construction for the aviation industry, considering international aviation, domestic aviation, and Flight Strips; in July, flood control, irrigation, pipe lines, utilities and hydro-power; in August, post-war work in cities, municipal financing, and housing plans; in September, post-war construction in foreign countries, for domestic railroads, and in recreational areas; in October, communications, and the conservation of our war-wasted resources through research; and in November, the post-war plans of our industry, including contractor associations, manufacturers, and equipment distributors.

Most of these articles were reprinted and given wide distribution. Some reprints of these articles are still available and will be sent to readers who would like to study them.

### Our Plans for the Future

During the dormant period following the war-construction boom, our field staff has traveled throughout the country as before to search out new methods, variations of old methods, information on ways to lengthen the life of equipment, and has reported them diligently. When the inevitable post-war construction boom arrives, we will be prepared to cover the wide field of highway and heavy construction even better, as the publishers of C&EMONTHLY plan further increases in the editorial field staff as well as the business staff to provide even greater service to our readers. With more and better quality paper available, other plans, already prepared, for a more readable, more attractive publication will be put into action.

Right here, I want to express my sin-

cere thanks to my associates on the editorial staff who have helped carry C&EMONTHLY forward on its twenty-five-year march. My thanks also to our many friends in the field who have contributed so generously their thought and time in furnishing field data and checking all articles and items for accuracy. Without their cooperation we could not have presented to you, our readers, such a volume of detail on job methods and organization.

We plan to continue with every means possible our service to you. This is *your* magazine. You have ideas of what you would like to see more, or less, of in C&EMONTHLY. We welcome suggestions and constructive criticism, so drop a line to the Editor and let's have an exchange of ideas. Most of our twenty-five years as an Editor has been spent in the field. We have found that our best ideas resulted from the stimulus of contact with construction and maintenance men on the job. From them will come the material and the inspiration to carry CONTRACTORS AND ENGINEERS MONTHLY

### ONE WAY TO GET IT DONE



"We locked them in, with rations, early in '43. They should have something completed by now."

on to what we hope will be even greater usefulness during the next quarter century.

## Announcing Improvements on the MISSISSIPPI WAGON



### You Now Get More Speed (up to 25½ MPH), Synchronized 4-Wheel Tractor-Trailer Brakes, Other Features

Improvements made to increase the general versatility and efficiency of the MISSISSIPPI WAGON, now more than ever make it "the World's Most Modern Hauling Unit."

Gear changes in the M-R-S Special International Diesel tractor now make it possible for MISSISSIPPI WAGONS to travel at speeds up to 25½ miles per hour, saving valuable time and increasing profits on long hauls.

Four-wheel trailer brakes are available and are synchronized with the hydraulic brakes on the tractor, providing unusually smooth, effective braking for fast stops and steep grades.

If your problem is hauling over the highways on long hauls, the MISSISSIPPI WAGON will

now provide you with still greater economy than heretofore.

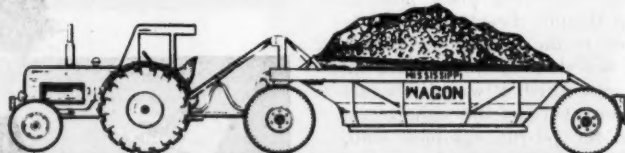
If your problem is construction work, the MISSISSIPPI WAGON will give you unusually low hauling costs per yard, placing you in the position of meeting and "beating" that tough postwar competition.

We can make deliveries for essential civilian uses, because our 1945 production is more than twice our 1944 production.

Write us or consult your nearest International Power Distributor for full information on MISSISSIPPI WAGONS—a thorough investigation will warrant your investment in MISSISSIPPI WAGONS—

"The World's Most Modern Hauling Unit"

# MRS



## MANUFACTURING CO.

JACKSON, MISSISSIPPI



### PROTECT WITH Fultex TARPAULINS WIND BREAKS

Fultex waterproof covers give economical protection—one of the most widely used, serviceable covers on the market. Recommended for heavy duty and long wear at low cost.

Quick delivery from stock on standard size covers.

FULTON BAG & COTTON MILLS

Manufacturers since 1870

Atlanta, St. Louis, Dallas, Minneapolis  
New York, New Orleans, Kansas City, Kan.



## Japanese Internees Used by Contractor

**Access Road Job Near Powell, Wyo.,  
Included Grading and Road-Mix Mat;  
Post Holes for Fence Dug by Machine**

† A 5.7-mile section of road-mix access road to the Elk Basin oil field in northern Wyoming was constructed in 1944 by the Taggart Construction Co., Cody, Wyo., under a contract awarded by the Wyoming State Highway Department. This job adjoins a similar one built the previous year by the same contractor in which a relocation of 2.1 miles reduced the maximum grade from 14 to 7 per cent and greatly aided hauling from the oil field to the refinery at Cody. The 1944 section is an addition to that vital link, extending it along an old country road; provides new bridges; and further improves hauling conditions to expedite production.

Because of scarcity of other labor, the contractor used a considerable number of Japanese internees from the WRA camp at the Hart Mountain irrigation project. Experience with this kind of labor, according to W. D. Whitlock, Resident Engineer, indicated that they were quite competent as truck drivers or operators of equipment but were not particularly efficient as common labor.

### Grading and Base

Two Caterpillar D8 tractors pulling 12-yard LeTourneau Carryall scrapers dug the drainage ditches and also hauled in embankment material from the old waste banks of nearby drainage canals. This material, of a gravelly nature, was compacted by rolling with two double-drum sheepsfoot rollers pulled by Caterpillar D7 tractors and finished with pneumatic rollers. The contractor installed a Rex 4-inch Speed Prime pump at a nearby irrigation ditch and a 1,000-gallon tank mounted on a Ford truck for hauling water for the embankment material, but it was found that throughout much of the job drying was more necessary than wetting. This was done by blade-mixing with two Caterpillar motor graders as well as by the addition of drier material from other locations.

The full width of 26-foot subgrade was covered with a sub-base of 9 to 15 inches of pit-run gravel loaded by a ¾-yard Northwest shovel and hauled an average of 3 miles in 3-yard loads by five Chevrolet trucks and 4-yard loads by nine GMC trucks. The pit-run gravel sub-base was compacted by the sheepsfoot and pneumatic rollers used on the subgrade. This material was paid for at the bid prices for excavation and cubic-yard-mile haul.

Work on this project was suspended on December 22, 1944, due to sub-zero weather, and was resumed as soon as weather permitted in the spring.

On top of the sub-base, a 2-inch compacted layer of crushed gravel meeting the following specifications was placed from shoulder to shoulder:

Crushed-Gravel Base Course	Per Cent Passing
Size (Square Opening)	
1-inch	100
¾-inch	75-100
No. 4	40-75
No. 10	30-60
No. 200	3-20

Material for this crushed-gravel base was produced at a pit near the north end of the job by a Pioneer Duplex No. 12 crushing and screening plant powered by a 150-hp Murphy diesel engine. Material was fed to the crusher by a bulldozer and was hauled away from the steel bins, into which it was discharged by a belt conveyor, by the same trucks that hauled the pit-run sub-base material.

### Bituminous Surfacing

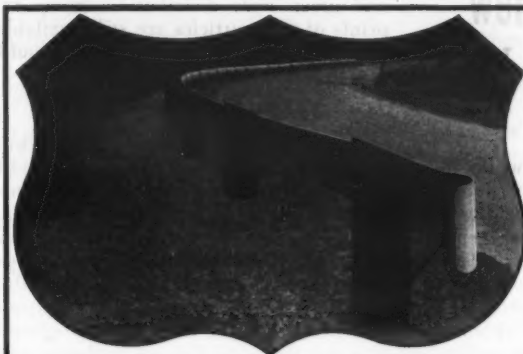
On top of the crushed-gravel base course, a prime coat of MC-1 was applied at the rate of approximately 0.40

gallon per square yard. This was shot in two 6-foot lanes adjacent to each shoulder, with a center application 14 feet wide at a slightly lower rate. This prime coat was permitted to cure for approximately a week before mineral aggregate meeting the following specifications was placed in a windrow along one side of the road:

Grading of Mineral Aggregate	Per Cent Passing
Size (Square Opening)	
¾-inch	100
½-inch	70-100
No. 4	45-75
No. 10	35-60
No. 200	5-10

The windrow was flattened to a width of 10 feet by a Caterpillar power grader, and then three equal applications of MC-3 asphalt were made, each consisting of 5.8 gallons per cubic yard to give a total of approximately 4 per cent asphalt. Blade-mixing was done by the two Caterpillar motor graders, which also spread the mixed and cured windrow to a 22-foot width on the 26-foot subgrade. Next a seal coat of approximately 0.33 gallon of RC-3 per square yard was applied to

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*Rounding the  
Curve of  
"Safety first"  
at Low Cost—  
TUTHILL  
GUARDS*

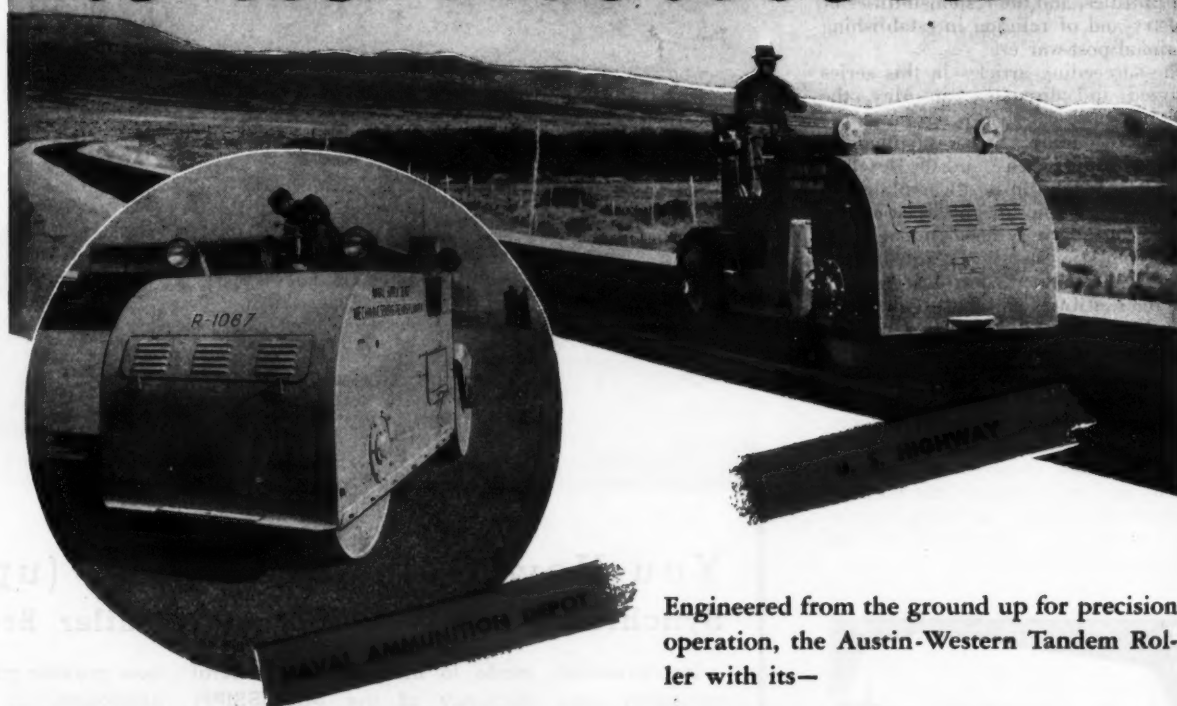
CURVES, embankments, bridge approaches, grade crossings—all are made safe with the TUTHILL Guard. It combines *high visibility, flexibility plus strength, low-cost installation, and economy of maintenance.* Available for maintenance or installation. Request details.

Pacific Coast Manufacturers and  
Distributors: U. S. SPRING &  
BUMPER CO., Los Angeles, Calif.

**TUTHILL SPRING  
COMPANY**  
762 W. POLK ST. CHICAGO 7 ILL.



## SURFACE SMOOTHNESS *is its business*



Engineered from the ground up for precision operation, the Austin-Western Tandem Roller with its—

**Variable Weight      Rigid Box Frame**  
**Smooth Power      Hydraulic Steer**  
**More Visibility      Less Overhang**  
**More Clearance**

**Convenient Single or Dual Controls**

performs in a manner that meets all specifications for high-type surfaces.

The Austin-Western Line also includes 3-Wheeled Rollers. Catalogs are yours for the asking.

**AUSTIN-WESTERN COMPANY,  
AURORA, ILLINOIS**





# Wyoming Road Job

(Continued from preceding page)

the surface and topped by 20 pounds per square yard of cover chips meeting the following specifications:

Size (Square Opening)	Grading for Seal Chips Per Cent Passing
3/4-inch	100
1/2-inch	95-100
No. 4	0-10
No. 10	0-5

## Culverts, Bridges, Fence

Because of existent soil conditions, concrete pipe, coated inside and out with water-gas tar to resist the sulphate, and laid with a mortar joint, was used for 30, 48, and 60-inch culverts, while smaller culverts, 18 and 24 inches in size, were constructed of vitrified-clay pipe, with Clay Products Association specification compound No. 111 for joint material.

The contract included the construction of four treated-timber bridges, one consisting of three 23-foot spans, one of two 11 and one 27-foot spans, a third of two 15 and one 23-foot spans, and a fourth of one 9-foot span. The contractor was so seriously delayed, however, in obtaining delivery of the treated timber and piling for these structures that this portion of the contract was carried over to the 1945 construction season.

An item of considerable magnitude on this project was the reconstruction of 19,600 linear feet of standard right-of-way fence and 29,500 linear feet of Type A right-of-way fence, built with full-pressure-treated 6-inch-diameter posts and wire equivalent to that in the fence which was in place before moving. The contractor expedited this work materially by the use of a post-hole digger on a McCormick-Deering tractor.

## Major Quantities

The major bid items include:

Excavation	99,290 cu. yds.
Cable-yard-mile haul	158,800 cu. yd./mi.
Watering, embankment	820 M-gals.
Sheepsfoot roller operation, embankment	500 hrs.
Pneumatic-tire roller operation, embankment	130 hrs.
Crushed-gravel base course	7,900 tons
Watering, base	200 M-gals.
Roller operation, base	100 hrs.
Vitrified-clay culvert pipe, 18-inch	2,824 lin. ft.
Vitrified-clay culvert pipe, 24-inch	1,908 lin. ft.
Standard reinforced-concrete pipe, 30-inch, tar-coated	180 lin. ft.
Standard reinforced-concrete pipe, 48-inch, tar-coated	72 lin. ft.
Standard reinforced-concrete pipe, 60-inch, tar-coated	280 lin. ft.
Re-laying pipe	114 lin. ft.
Untreated timber (irrigation structures)	3.5 MFBM
Untreated timber (bridges)	1.824 MFBM
Treated timber	66,064 MFBM
Treated timber piling	2,204 lin. ft.
Structural excavation	165 cu. yds.
Grouted riprap	40 cu. yds.
Class 1 riprap	160 cu. yds.
Crushed gravel for mineral aggregate, 3/4-inch maximum	5,600 tons
MC-3 asphalt	250 tons
Base treatment, MC-1	140 tons
Seal coat, RC-3	120 tons
Stone chips	750 tons
Processing roadway	75,600 sq. yds.
Standard right-of-way fence	19,600 lin. ft.
Type A right-of-way fence	29,500 lin. ft.

## Personnel

The contract for Project DARM-20, 5.7 miles of road-mix mat and structures on the access road to the Elk Basin oil field, was awarded on August 12, 1944, by the Wyoming State Highway Department to the Taggart Construction Co. of Cody, Wyo., on its low bid of \$158,000. Lloyd Taggart acted as his own superintendent and W. D. Whitlock was Resident Engineer for the Wyoming Highway Department, of which J. R. Bromley is Superintendent.

## Atlas Powder Co. News

The New York District sales offices of the Explosives Division, Atlas Powder Co., Wilmington, Del., have been moved to the Lincoln Building, 60 E. 42nd St., New York City. When alterations are completed, the offices will occupy the entire 52nd floor; in the meantime they are in temporary quarters on the 28th floor of the building.

The newly opened Chicago District sales office of the Atlas Explosives Division is headed by James H. Buchanan as

Manager. Mr. Buchanan has represented the company in Chicago since 1938, and before that time was its Mexican representative for eight years. The Chicago office, located at 135 So. LaSalle St., Chicago 3, Ill., will cover the states of Illinois, Wisconsin, Minnesota, and most of Indiana.

Guy F. Rolland, who has served with Atlas in research work since 1927, has been appointed Director of the Reynolds Experimental Laboratory, Atlas explosives research facilities near Tamaqua, Pa. In addition to his research work, which has more or less specialized on blasting caps, Mr. Rolland has also traveled around the country studying customer problems.

J. E. Dedman, Jr., who has been Assistant Manager of the Export Section of the Explosives Department, has been named Export Manager and John V. Kelly has been appointed Special Representative of the Export Section. Both Mr. Dedman and Mr. Kelly will make their headquarters at the main offices in Wilmington, Del.



# LIGHT

When and Where you want it

## CLARK PORTABLE LIGHT PLANT

"the light that's always ready"

Completely independent — no batteries or extras necessary — mounted on a handy two-wheel truck. The Clark Portable Light Plant can be taken to any location and be in operation in a matter of minutes. Keep a Clark Portable Light Plant as part of your standard equipment, it will pay for itself many times over. Use it to power small tools.

**SPECIFICATIONS:** The light plant consists of 1 portable generating unit (1-hp. air-cooled gasoline engine driving a 500-watt 125-volt direct-current generator) mounted on an all-steel hand truck; 2 portable service lights (200-watt and 150-watt); a 150-watt spotlight; three 30-foot extension cords, and a 1/2-gallon gasoline tank supplying the plant for four full-capacity hours.

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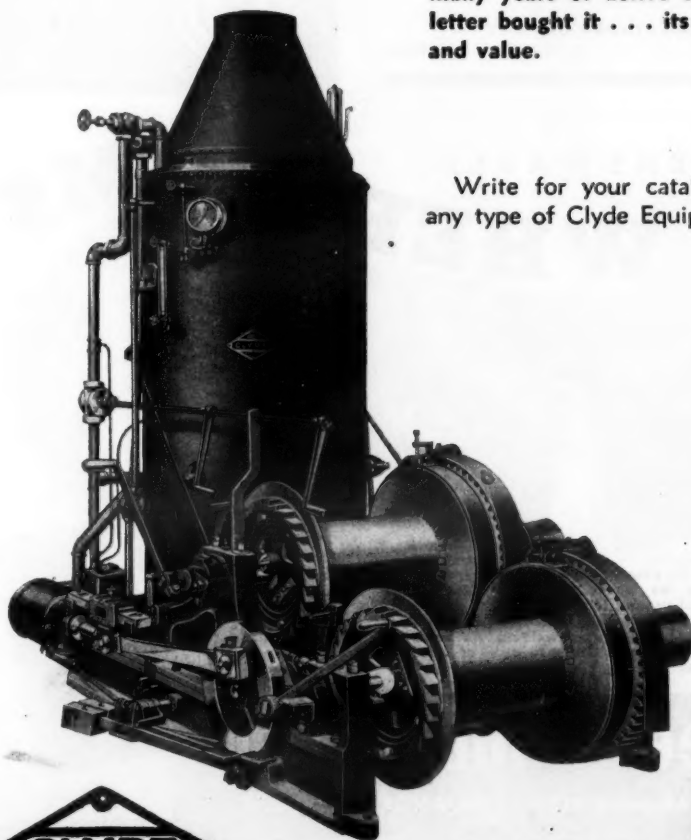
# LOW MAINTENANCE COST WITH A CLYDE

## \$26.73 MAJOR REPAIR ITEM ON 37 YEAR OLD CLYDE HOIST . . .

"I bought this used 2-drum Clyde steam hoist four years ago . . . since that time it has been run almost continuously. This machine has given perfect satisfaction with only a few minor repairs . . . in fact the only major item of expense incurred during the period I operated it was \$26.73 for friction blocks."

This Clyde hoist, sold to its original owners in 1908, had many years of active service before the author of the above letter bought it . . . its record is positive proof of true quality and value.

Write for your catalog on any type of Clyde Equipment.



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BARGE & DREDGE  
MACHINERY



**CLYDE IRON**  
DULUTH, 1

**WORKS, INC.**  
MINNESOTA



## Niagara Airport

(Continued from page 42)

equivalent of six bags of cement was used to a batch in a 1:2.5:3.0 mix, with not more than 5 1/4 gallons of water to a bag of cement. Water was taken from the City of Niagara Falls supply from a pipe line at the Bell Aircraft Co. plant and brought to the batching plant in 500 feet of 2 1/2-inch pipe line. While the specifications called for a strength of 3,750 pounds in 28 days, the concrete developed a strength of more than 5,000 pounds in 28 days. Seventeen truck mixers were used in the pouring with a five-minute mixing period required in the trucks.

The 150-foot runway was paved in six strips of 25 feet each. The panels are 120 feet long and are separated by Acme joints. While no reinforcing was used, 5/8-inch round bars, 2 feet 6 inches long

and spaced 30 inches on centers, were used as ties between slabs at transverse construction joints. The truck mixers delivered the concrete by chutes from both sides at the same time. Flex-Plane finishing and joint-cutting machines were used. Curing was done by spraying Hunt Process compound over the surface. Numbering the south strip as 1 and the north strip as 6, the order of paving was: 5-6-4-2-1-3.

### Drainage

About 4 miles of new pipe have been added for drainage at the airport. On the down-grade side of the runway and 3 1/2 feet from the edge of the concrete paving is an 8-inch plain-concrete pipe. The depth of this pipe varies with the grade from 2 1/2 to 4 1/2 feet below the top of the pavement. Excavation for the drainage pipe was done by a Buckeye 140 trencher, a Parsons 750 trencher, and a Lorain 75 Backdigger. The shovels previously mentioned and also a Universal truck crane were used in set-

ting the pipe. Backfilling was done by shovels and bulldozers and compacted by pneumatic tampers.

The lower half of the pipe is imbedded in impervious material and that half of the joint is sealed with jute. The upper half of the joint is unsealed and covered with a cotton fabric saturated with tar. The 20-inch-wide pipe trench was back-filled with graded slag which connects with the porous base course. By this construction, subsurface water is speedily drained from beneath the pavement through this porous material until it reaches the drain pipe. These side drains in turn empty into lateral sewer pipe whose joints are sealed with cement mortar.

An existing box culvert, 12 feet wide x 5 feet high, which carried Cayuga Creek under a diagonal runway had to be extended 155 feet to pass beneath the new taxiway. Wooden forms and truck-mixed concrete were used in the pour. The floor of the culvert is plain concrete

(Concluded on next page)

## New Gen. Sales Manager For Contractors Machinery


J. Frank Sims has been made General Sales Manager of the Contractors Machinery Co., Inc., Batavia, N. Y., manufacturer of Trojan road equipment, and will direct all sales activities.

Mr. Sims' experience with construction equipment includes several years on the reconstruction of the Mississippi River levee system following the 1927 floods. In 1934 he became district representative for the International Harvester Co., operating in the southern, central and eastern districts, and in 1942 was transferred to the International Washington office where he worked directly with the Army, Navy, Marine Corps, and WPB in the purchase of industrial power equipment. When International Harvester created the new Industrial Power Equipment Division, he was made Zone Manager with headquarters in Richmond, Va., where he remained until his recent appointment.

# SAFE-LINE

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Buy Now—Buy More—MORE!







C. & E. M. Photo  
A Buckeye 140 digging a section of the 4 miles of trench for 8-inch plain-concrete lateral drain pipe at Niagara Falls, N. Y., Airport.

## Niagara Airport

(Continued from preceding page)

6 inches thick while the walls and roof are of reinforced concrete 12 inches thick.

### Runway Extensions

Both of the existing diagonal bituminous-macadam runways were extended on their northern ends with concrete pavement 150 feet wide; the northeast runway was extended 1,040 feet and the northwest runway 670 feet. This slab is 9-6-9-6-9 inches thick. The runway pavement is supported on a 6-inch compacted-slag base course and a 3-inch layer of screenings with side drainage as in the main runway. The crown is at the center of the pavement with a  $1\frac{1}{2}$  per cent slope to the edges. Compacted shoulders 75 feet wide are on either side.

### Taxiways

The 6,051 feet of taxiways connect the aircraft company buildings at the south end of the field with the new east-

west runway at the north end. One taxiway goes up the east side of the field while the other goes up the west side, tying in at opposite ends of the new runway. These pavements are 50 feet wide with a 9-6-9-6-9-inch section of concrete. The pavement bears on a 12-inch slag base course resting on a 3-inch layer of slag screenings. The crown is in the center with a pitch of 1.5 per cent to the shoulders which are of compacted material 25 feet wide. An 8-inch drain pipe located  $3\frac{1}{2}$  feet from the edge of the pavement is laid on both sides of the taxiways.

### Major Quantities

The major quantities involved on this project were:

Item	Amount
Excavation	270,000 cu. yds.
Plain-concrete pipe, 8-inch	12,000 lin. ft.
Plain-concrete pipe, 10-inch	1,300 lin. ft.
Plain-concrete pipe, 12-inch	2,000 lin. ft.
Reinforced-concrete pipe, 15 to 30-inch	4,400 lin. ft.
Reinforced-concrete pipe, 60-inch	1,400 lin. ft.
Compacted fill	70,000 cu. yds.
Manholes and catch basins	90
Topsoil and seeding	83 acres
Slag base course	50,000 cu. yds.
Concrete pavement	148,000 sq. yds.
3-inch fiber duct	11,000 lin. ft.

### Personnel

Construction on these improvements to the Niagara Falls, N. Y., Municipal Airport was started on July 14, 1944, by the contractors, the Dutcher Construction Co. and John B. Schultz Contracting Co. of Buffalo, N. Y. A total of 150 men was employed on a single shift from 7 a.m. to 7 p.m. as long as the season permitted. With the exception of the seeding, the contract was finished by December 30, at a total cost of \$970,000. Frank Ersitti was Superintendent for the contractors. Dale A. Losey was Project Engineer for the U. S. Engineer Office. The work was started under the supervision of the Syracuse Office, of which Col. John Ellman is District Engineer, and completed under the direction of the New York District Office, of which Col. Edgar W. Garbisch is District Engineer.

*Use your equipment wisely, keep careful check on tires, brakes, and batteries, and lubricate regularly. The life of irreplaceable equipment must be prolonged to maintain transportation.*

### International Harvester Announces Promotions

The resignation of M. F. Holahan as First Vice President of the International Harvester Co., Chicago, Ill., has been announced. Mr. Holahan had been with the company for fifty years and will continue on the Board of Directors and as a consultant for management. J. L. McCaffrey, formerly Second Vice President, succeeds Mr. Holahan, and is in turn succeeded by W. E. Worth, former Vice President in charge of supply and inventory.

Four other changes in the officer group have also been announced. Mercer Lee, former Assistant to the Vice President, has been elected Vice President in charge of supply and inventory. Peter V. Moulder, General Manager of the Motor Truck Division; R. P. Messenger, General Manager of the Farm Implement Division; and Ralph C. Archer, General Manager of the Farm Tractor Division, have also been named Vice Presidents, to head their respective divisions.

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**CLEVELAND DR30 WAGON DRILLS** are unsurpassed in maneuverability. They drill at any angle and in any direction—flat holes from 4" to 8' above ground—also straight up or down. Feed travel is over 8', permitting 6-foot steel changes, and the machine handles depths to 25' or more. The DR30 has a double screw U-bar jack, a recoil device to hold drill to its work, an improved centralizer, and a forward leg point to steady the drill. All these features make the Cleveland DR30 the most popular wagon drill ever built. Ask for Bulletin 132.

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**CLEVELAND H10 SINKERS** are favorites in the 45 lb. class. Easily held, these fast cutters have strong rotation, and blow the holes with unfailing certainty. Either wet or dry construction. "T" handle illustrated is standard; open spade handle also available. All standard chuck sizes for collared drill steel, and plain or lugged shanks. Cradle mounting available for 24", 30" and 36" steel changes. The end-seating valve improves with use—no increase in air consumption as the drill grows older. Efficient lubrication of even hard-to-reach spots like flutes of the rifle bar, forward chuck bearing, etc. Bulletin 122 describes Cleveland Sinkers in detail. Ask for it.

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JUST fit the required base to the Union Hammer, turn it and this one-piece double-acting pile driver is prepared to perform its work! These easy-to-fit bases are supplied for all Union Hammers, for every type of pile driver service.

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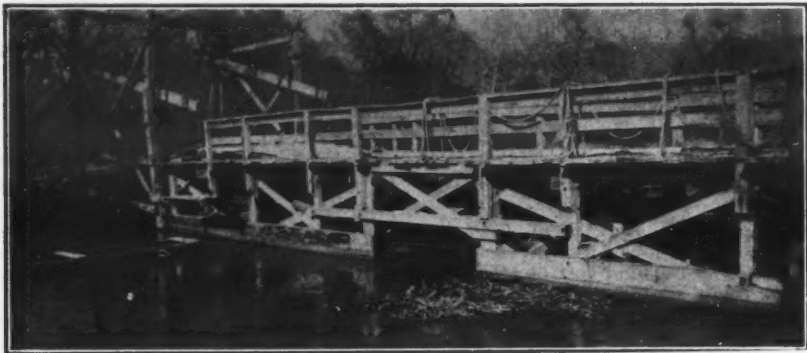
Birmingham 1, Ala.	Lexington 19, Ky.	Salt Lake City 1, Utah
Butte, Mont.	Los Angeles 11, Calif.	San Francisco 3, Calif.
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An interesting old pontoon bridge across the Vermilion River in Louisiana.

### Old Pontoon Bridge Soon to Be Replaced

The forward march of highway transportation leaves in its path the destruction of many picturesque old bridges which "old timers" are loathe to see give way to more modern structures. The old covered bridge is in this category, and an interesting old bridge spanning the

Vermilion River about 9½ miles north of Abbeville, La., is also fated to be replaced by a modern structure.

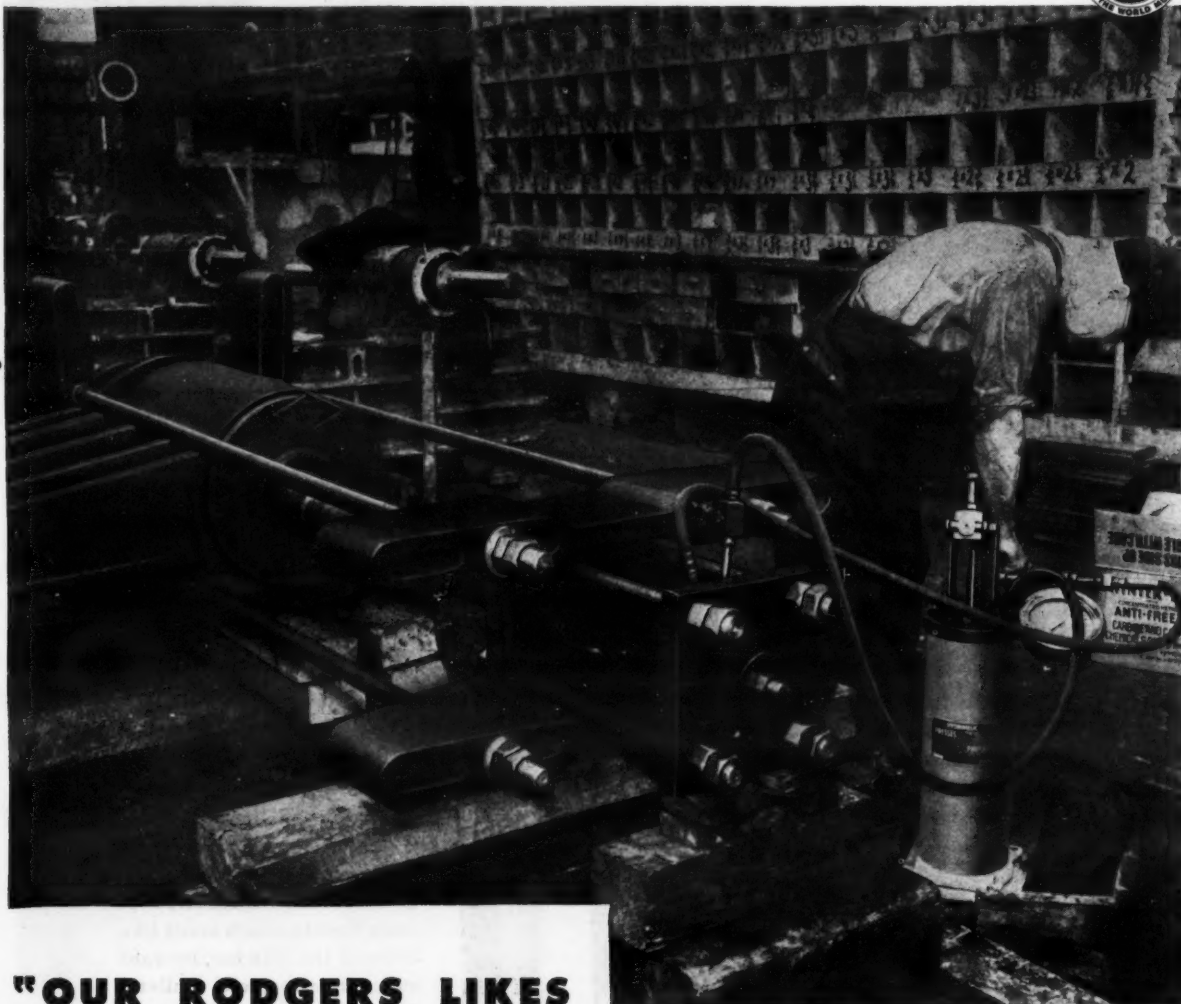
This picturesque old floating wooden bridge, with a 60-foot span, is supported by two wooden pontoon barges 2 feet deep, with an 8-foot opening between them. The bridge is opened for river navigation for its entire span by pivoting at its eastern end. The keeper of

the bridge, who lives in a nearby house, responds to the signal of a river craft seeking passage. He first raises the apron at each end which connects the bridge to the land, thereby releasing the barges. The span, pivoting at the east end, floats slowly downstream with the current. When the boat has passed through, the keeper pulls the bridge back in position by means of a Spanish windlass located on the span and anchored to a tree on the shore upstream.

### Fruehauf Purchases West Coast Company

The purchase of Trombly Truck Equipment Co., of Portland, Ore., has just been announced by Fruehauf Trailer Co., 10928 Harper Ave., Detroit 32, Mich. This new addition to the firm's facilities in the northwest is part of an overall western expansion program planned to increase service to users of trailers. The Trombly shops will operate in conjunction with Fruehauf's present Portland plant.

NO. 26 OF A "READY-WITH-A-RODGERS" SERIES



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The Diamond Iron Works Inc., Minneapolis, relies on its Rodgers Universal Press. Like other users, it appreciates the portability and adaptability of the Rodgers, which does the job wherever

Rodgers special 200-ton unit forcing bearings and sleeves from the pitman of a Diamond rock crusher.

pressing, pulling, or lifting power is needed. For complete information and prices, write or wire Rodgers Hydraulic, Inc., 7415 Walker Street, St. Louis Park, Minneapolis 16, Minnesota.

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Light in weight yet built for heavy-duty service, it enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

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Return From  
Service.  
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A present-day divided highway and modern grade-separation structure.

## Our State Highways, Past, Present, Future

(Continued from page 2)

inventions, tremendous strides in every direction of human endeavor, some that then seemed impossible and fantastic, yet which we now accept as commonplace. With highway traffic doubled in twenty-five years, with air transport service of tremendous proportions, just what will be the overall picture of our highway system? Will it differ materially from our most modern construction of this day and generation?

Not being the seventh son of a seventh son, I am somewhat limited in my vision of the future highway pattern, but the following suggestions as to the future seem quite possible and probable.

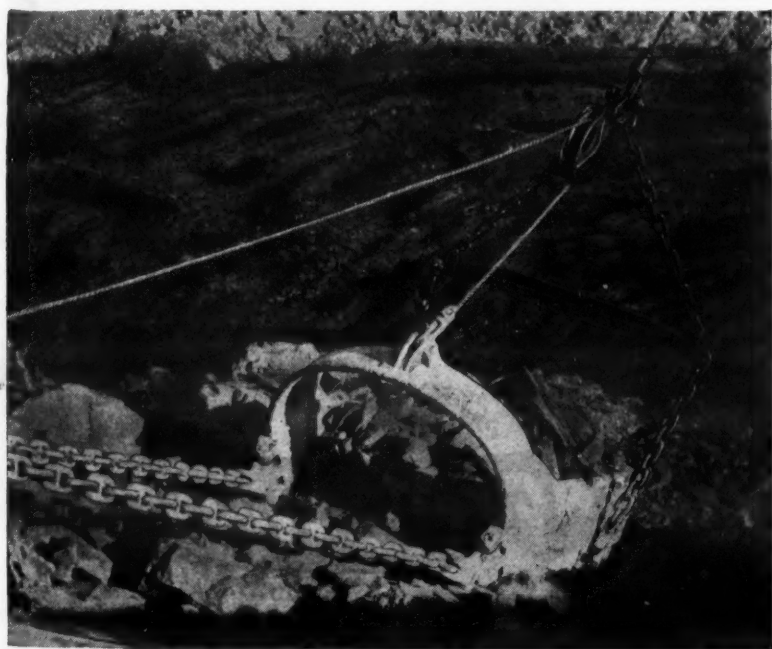
There will be more and more construction of multiple highways with separation strips, thus channelizing traffic in each direction; the traffic lane will not be less than 12 feet wide; under-

passes and overpasses will separate traffic at intersections. It will be as easy to drive through a city as out in the open country because of arterial and elevated-roadway construction. To care for local traffic, there will be more service roads built for every highway of importance.

On the main through routes of the future a speed of 75 miles will be perfectly safe and normal, and an average speed of 50 miles per hour will be commonplace. Higher standards on our important roads will be the order of the day. To make highways more attractive and to avoid the monotony we have occasionally seen on some of our highways, landscaping will be more general and in greater variety. Excessive numbers of hot-dog stands and other transient service places will be a thing of the past on important routes. The important highway of the future will be streamlined like the vehicles that travel over it, a utility of beauty, but also so constructed that it will be the last word in traffic speed and safety.

New surfacing, more durable, less expensive, more skidproof, and more at-

(Concluded on next page)



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## Expressways an Aid To Small Industries

Speaking before a gathering of businessmen at Schenectady, N. Y., on New York State's proposed 486-mile expressway from the northern boundary of New Jersey along the west bank of the Hudson River, through the Mohawk Valley and southwesterly along the Lake Erie plain to the Pennsylvania line, Bertram D. Tallamy, Deputy Superintendent, New York State Department of Public Works, noted the effect this great project will have on industry in the Empire State.

After pointing out that the 486 miles of expressway will have relatively flat grades, easy curves, and long sight distances so that, within the limitations of the driver and vehicle, it will be a simple matter to drive from Buffalo to Albany or practically to New York City, non-stop, at a relatively high rate of speed, Mr. Tallamy said, "It will offer new opportunities to industry. It will be important in attracting those new industries to the state. Many small plants depend upon

a nearby urban market. They must be near it from the point of view of time. But certain economic factors existing close to these urban centers have often precluded their establishment in the past. In the future, because of the high safe rates of speed at which trucks and cars will be able to operate on the throughway, new territories will be open, new labor markets, new sources of raw materials, and new markets for agriculture areas made available.

"I understand that the location of the new electronics plant to be established at Syracuse," said Mr. Tallamy, "was determined to a large extent by the location of the throughway. That expressway will provide high-speed vehicular transit of light commodities made by that company west to Rochester, Buffalo, and the Pennsylvania line not far from Erie. Easterly it will readily serve Utica, Schenectady, Albany, and New York markets."

*Guns or lives? Which will it be?  
Help save lives by buying War Bonds.*



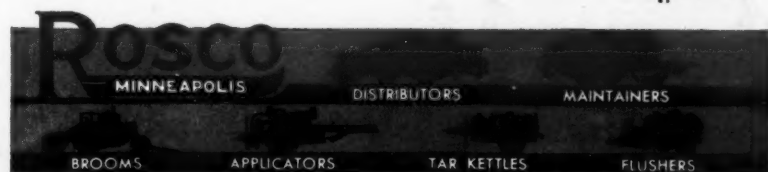
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The Rosco Patented Master Valve Serves you these seven ways: Starting spray... circulating... loading... transferring... pressure control... clean out... cut-off. Reverse suction makes a clean cut-off at nozzles—no drip.

And the original folding spraybar is equipped with 4 sections, vertical lift and shift, horizontal bar pivot for safety. Sump type suction, tell-tale loading gauge.

Another exclusive Rosco feature is front mounting of master valve pump and engine—balances load weight, provides safe and roomy rear platform and low maintenance cost. All in all, the Rosco Distributor is as nearly automatic as modern engineering can produce. See your Rosco dealer, or write us for complete information.

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## Our State Highways, Past, Present, Future

(Continued from preceding page)

tractive in general appearance may be discovered and applied. There will be less necessity for the tremendous number of traffic signs that now intrude themselves on our vision because of the haphazard design and location of present highways. With improved equipment, highway maintenance and upkeep will be at a new high; snow removal and ice control will be quicker and more efficient with new types of equipment and methods; and the whole nation will appreciate and benefit from the neat and attractive highways which link the communities of the country together. Left-hand turns may be completely eliminated. Center strips will be wider, and more parking places along the highways will be provided. In all probability, the average distance of travel by motor vehicle will be less than at present because of the swifter travel by air. Air travel, in and of itself, will create a great deal more local highway travel.

### Future Financing


The financial part of the highway program of the future will necessarily be of extreme importance. From the hills of old New Hampshire and its fine highway officials comes this interesting bit of information: in 1535, James V of Scotland issued a proclamation governing traffic on the first paved streets of Edinburgh. Empty carts and vehicles were compelled to pay a halfpenny tax, loaded vehicles one penny "to repair and maintain the causeway". This was perhaps the first highway-user tax in history and applied equally to private and government-owned vehicles.

Our Federal taxation policy confronts two alternatives: either retire from the field of automotive taxation or return to the states the entire proceeds in Federal taxes. These returns should be more proportionate to the sums respectively collected than under present methods of apportionment which heavily subsidize certain states or regions due to pressure-group legislation.

The declared policy of the Federal government has been that state governments should not practice diversion of motor-vehicle tax revenues from highways to other purposes; and in some instances states have been penalized by withholding Federal Aid for highways because of such diversion. Despite this fact, the Federal government has practiced diversion by hundreds of millions annually. In the 1942 fiscal year Federal taxes on vehicles, parts, and fuels exceeded \$677,000,000, while during the same period less than one-fourth of this amount was returned to the states in Federal highway aid.

### Conclusion

With the above financial discussion

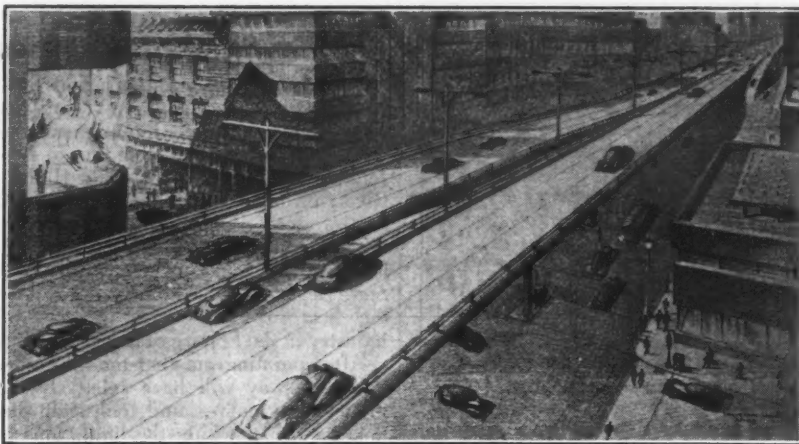


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3181-27 W. Grand Avenue, Chicago 22, Ill.



Public Roads Administration Photo

A suggested design for an urban elevated highway of the future, based on the proposed standards for the National System of Interstate Highways and providing central-exit and lateral-entrance ramps.

which, perhaps, is not strictly a part of this subject, I bring to a close what has been to me an extremely interesting opportunity to review and discuss the gen-

eral highway situation. We have covered past, present, and future, briefly to be sure, in the field of state highway development. In 1970, many of us will

not be around to check up on the prophetic part of this statement, but that is not important. If this article stirs up some thought and action for more and better highways, it will not have been in vain.

### Cummins to Double Output

The immediate construction of a new building which will permit Cummins Engine Co., Inc., Columbus, Ind., to double its present production of heavy-duty Model L Cummins diesel engines has been authorized by the War Production Board as the result of the urgent need for these heavy-duty prime movers in several essential industries. The new building, which will be financed entirely by the company, will provide 35,000 square feet of floor space and will be erected on a factory parking lot.

The Cummins Model L diesel is a six-cylinder 7 x 10-inch medium-speed engine of 2,309-cubic-inch piston displacement, developing its maximum 250-hp output at 1,000 rpm.

## BARNES ... the Pumps of Super-Achievement ALL OVER THE WORLD

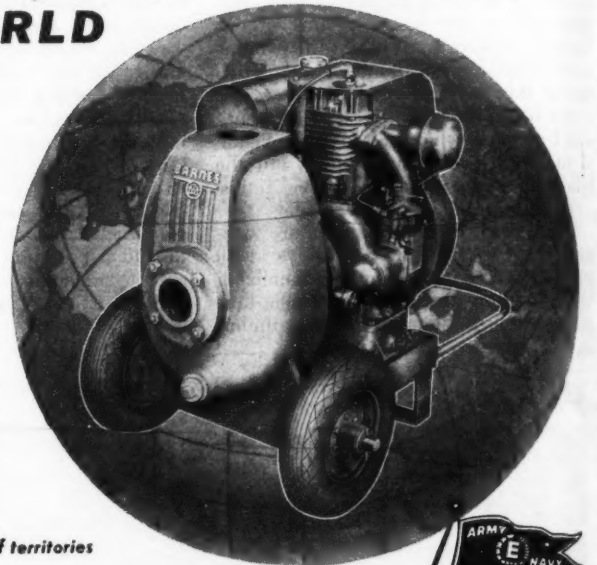
**WHEN** the going's tough, when speed is a must ... supplying vital water for men and machines in combat areas ... keeping shelled and mined ships afloat ... setting the pace for fast moving Seabees and Army Engineers on rugged construction projects ... refloating sunken ships in bottled harbors—all gruelling night and day tasks ... Barnes pumps are doing a super-job.

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should not exceed 3½ feet for heavy units.

### Thermoplastic Rubber For Sealing Road Joints

Sealz, an expansion, contraction, and construction-joint sealer made of thermoplastic rubber, which can be melted and poured with regular types of bituminous heating kettles and pouring pots, is described in a bulletin issued by Dispersions Process, Inc., Naugatuck, Conn., under the management of the U. S. Rubber Co. of New York City.

This joint sealer can be poured flush with the slab surface, preventing the entrance of surface water and effectively sealing the joint section during all cycles of expansion. The manufacturer states that it does not extrude, providing a smooth-riding surface even at extreme summer temperatures, and adheres to the concrete at temperatures below zero. Sealz, which meets the test requirements of Federal and state engineering organizations, is packed in 50-pound bags.

Engineers and contractors interested in securing more complete information may obtain copies of this bulletin entitled "How to Reduce Maintenance

Costs of Concrete Pavements" by writing to Samuel P. Tauber, exclusive sales agent for Sealz, at 1230 Sixth Ave., New York 20, N. Y. Just mention this item.



The new Bruning Model 41 printing-developing unit.

### A Black and White Developer-Printer

For any engineering office requiring black and white prints in medium quantities, Charles Bruning Co., Inc., 4754 Montrose Ave., Chicago 41, Ill., has developed a Model 41 which combines individual printing and developing units in a single cabinet with a steel frame of box-girder construction.

The unit has a printing-speed range up to 6 feet per minute, depending on the transparency of the original, printing either roll stock or cut sheets, with a width of 46 inches. The light source is a 2,000-watt glass mercury-vapor lamp within a 6-inch-diameter cylinder. Prints are delivered at the front of the machine within easy reach of the operator. A new type of ironing roll results in flat dry prints.

Mounted on four sturdy casters, the printing-developing unit can be moved to and operated in any desired location. No plumbing connections are necessary and there is no need for outside outlets for exhaust fumes, because there are none.

Complete information regarding this Bruning medium-priced machine may be secured direct from the manufacturer by mentioning this illustrated news item.

### Place Your Portable Extinguishers Carefully

A portable fire extinguisher is helpful only in proportion to the speed with which it can be put into operation. Careful thought, therefore, should be given to the location of all portable extinguishers so that they are easy to get at, clearly seen or their position indicated by conspicuous signs, and to avoid the possibility of their being cut off by the fire. Another precaution is a daily inspection, to make sure that no obstructions, particularly of an inflammable nature, have been placed in the way of ready access.

The number of extinguishers will of course vary with the fire hazard. An area presenting only normal fire hazards will require at least one large or two small extinguishers, so placed that they can be reached by traveling no more than 50 feet from any point in the area. Where the hazard is light, fewer extinguishers will be necessary, and where the potential danger is greater, more should be on hand.

Extinguishers intended to safeguard a specific hazard should be mounted near it but out of danger of becoming involved if it catches fire. In a relatively small room, extinguishers just inside or outside doorways leading into the room give the best protection because this arrangement permits a person to seize the equipment quickly while having a safe line of retreat in case of necessity.

Extinguishers may be mounted on columns or walls, with hangars, brackets or shelves as supports. The tops of easily handled units should not be more than 6 feet from the floor, and this distance

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The Army called for the roughest, toughest truck that could be built, designed to begin its job where most other trucks stop.

Ward LaFrance has been producing this super truck in volume for Army ordnance. Out of it has come an entirely new standard of heavy-duty truck reliability and performance. Ward LaFrance has been building

good trucks for a quarter of a century, but frankly, never any that could compare with these new commercial models inspired by the design and performance of the Army M1A1 Heavy Wrecker. They are big trucks with pay load capacity ranging up to thirty tons. They are built to take a beating and still stay on the job. They are designed, engineered, and manufactured to establish new standards in low-cost hauling. Before you invest, investigate Ward LaFrance.

### FRANCHISES ARE AVAILABLE

to aggressive dealers in a number of attractive territories. Leading dealers now handling smaller, non-competitive trucks will be especially interested in the Ward LaFrance dealer plan.

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## TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA,



NEW YORK







A standard eye safety hook with the new Laughlin latch.

### An Improved Latch For Safety Hooks

An improved latch for safety hooks which permits the use of 80 per cent of the full throat opening has been announced by Thomas Laughlin Co., of Portland, Maine. The wider throat opening results from the ingenious design of the latch assembly which, when open, straddles the neck of the hook. The load to be hoisted is easily slipped into the hook but cannot be removed until the operator's fingers release the latch, thus preventing the dropping of loads and endangering bystanders. If the hook is overcrowded by the sling, the latch will not snap into place. If the hook spreads because of excess loading, the latch opens up as a warning signal.

Made of pressed steel in the smaller sizes and cast bronze in the larger, this improved latch is riveted at the neck of the hook to a cam which is an integral

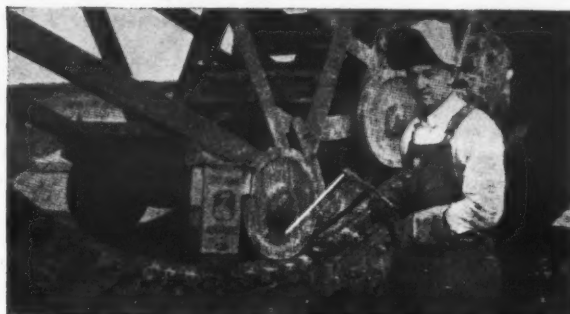
part of the hook forging. The latch is actuated by a stainless-steel wire spring which coils around the hub of the cam on each side and extends down the inside of the latch.

Safety hooks with these new latches are modifications of standard eye, straight-shank, and swivel types with safe working-load capacities from 1/2 to 15 tons. Complete information on these hooks and the new safety latch may be secured direct from the manufacturer by mentioning this illustrated news item.

### U. S. Rubber Appointments

Luther B. Martin has been made Director of the tire development and research activities of the U. S. Rubber Co., with headquarters at Detroit, Mich. Mr. Martin has been associated with the company since April, 1918, when he joined the staff of the Hartford, Conn., rubber works as a chemist, later becoming Chief Chemist and then Factory Manager. In 1929 he was transferred to Detroit and eventually was made Assistant Director of tire development. He is Chairman of the Ordnance Advisory Committee of the Tire and Rim Association, a member of the WPB Tire and Tube Technical Consulting Committee, and a member of the Synthetic Test Committee of the Tire Industry.

Dr. Arthur W. Bull has been appointed Associate Director of tire development. He has been doing research for U. S. Rubber since 1928, first at the general laboratories in Passaic, N. J., and later at Detroit. In the early days of the war, Dr. Bull did important work in the development of bullet-sealing fuel tanks for airplanes, and subsequently was made Manager of the tire engineering department at Detroit.



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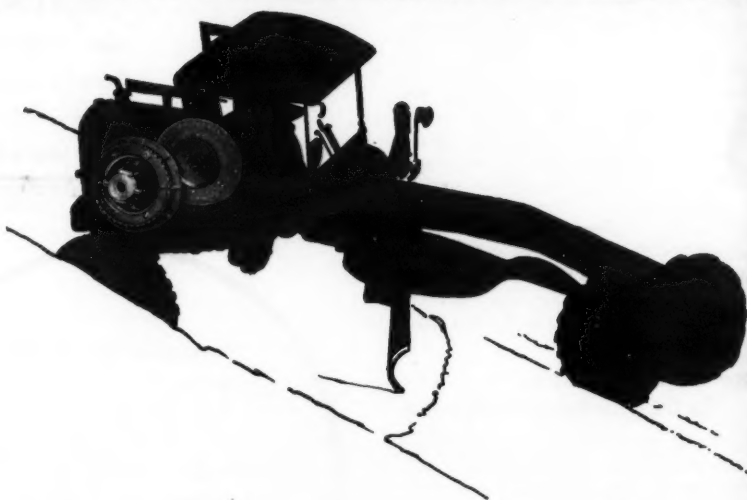
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Don't wait until peace comes. Overnight, wartime destruction may turn to peacetime construction — and competition become keener, and more ruthless. Make sure that your products benefit from the latest clutch developments. Put the advantages of our unmatched transmission engineering experience and clutch manufacturing facilities into your new designs. Let our engineers show you why "ROCKFORD" — on your blueprints — means the most suitable power transmission control.

SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.

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CLUTCHES

### Jap Peace Term for the U. S.

"All naval air bases and air installations to be destroyed, except those needed by Japan."

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# Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

## Results, Not Methods, Counted in Rock Removal

An excavation subcontract provided that, should "rock be found which would require removal by blasting, \$1.10 per cubic yard will be paid for by measurements of the architect". The site of the work was a built-up section of Wilkes-Barre, Pa. Because of proximity to buildings and streets, and fears as to what blasting would do to them, the subcontractor resorted to removal of the rock by the jack-hammer method, himself absorbing the considerable difference between the cost of blasting and the method used. The general contractor refused to recognize liability at the \$1.10 rate, because there was no blasting. Strange as it may seem, two courts—a trial court and an intermediate appellate court—ruled that the general contractor was right in his contention. But the Pennsylvania Supreme Court reversed the decision, saying, in part (Sgarlat v. Griffith, 36 Atl. 2d, 330, 332):

"We must say that we think this a forced and strained construction of the contract. We are certain, at the time the contract was made, the architect, the general contractor, and the subcontractor, this appellant, did not give any consideration to the method of removal of the rock and made it clear that the appellee [the general contractor] should only pay extra for that kind of rock which usually requires blasting. There is no doubt that the quick and cheap way to remove such rock is by blasting; and it must be admitted that this rock would have been removed in that way except for the danger incident to blasting in that place. Since appellee got full and complete performance of his contract, as is demonstrated by the certificate of the architect, he has no reasonable ground of complaint and he should have long since paid the appellant the contract price for his work. Any other view would result in the forfeiture of appellant's labor and materials for what at most can only be regarded as a trivial or inappreciable variation in the contract. The law is not so harsh as to put such a penalty upon an innocent person for a minor defect which did not damage either party or cause him to lose a single cent."

## Concurrent Negligence Of Contractors on Job

A clause of the New York Labor Law required that the floor of a structure under construction be planked over, for the safety of men working on the job. Through fault attributable to the general contractor, this was not done.

An employee of a subcontractor carelessly dropped a piece of pipe through the open floor and it fell upon an employee of another subcontractor, injuring him.

The general contractor insisted that Subcontractor A was solely and exclusively responsible and demanded indemnity under a clause in the subcontract which required the subcontractor to protect the general contractor against claims of third persons based upon negligence of the subcontractor or his employees. But the New York Court of Appeals ruled that the clause did not apply to claims based upon concurrent negligence of the general contractor and the subcontractor. (Walters v. Rao Electrical Equipment Co., 43 N. E. 2d, 810.)

The Court of Appeals decided that "the failure of the general contractor thoroughly to plank over the steel beams was a breach of a primary non-delegable duty", which must be regarded as a direct cause of the accident, and that the subcontract was not so worded as to indicate a mutual purpose to require the subcontractor to reimburse the general contractor against liability for an accident which was as much the fault of the latter as of the subcontractor.

## Crediting Payments To Different Debts

Because of the diverse interests in funds earned in construction, there is no industry in which the law of "application of payments" has more important or frequent use than it has in that field.

An outline of the law on this subject was given by the Supreme Court of Louisiana in the case of Madison Lumber Co. v. Helm, 13 So. 2d, 349. The substance of the decision is as follows:

Generally, a debtor in making a payment to a creditor to whom he owes two or more separate debts has a right to direct the creditor to apply the payment to any one of those debts. If the debtor "passes"—does not say to which claim the payment is to be applied—the creditor, generally, has the right to pick out the debt that is to be credited.

But, notes the Court, "that rule may be sub-

ject to some exceptions, as where the payment, to the knowledge of the creditor, is derived from a source such that it would be a fraud for the creditor to consent with the debtor that the money be diverted and applied otherwise than as the debtor had expressly or impliedly agreed with his sureties."

The last stated exception to the general rule has often been applied by the courts against a material man or subcontractor who receives a payment from a general contractor, knowing or having good reason to believe that the general contractor received the wherewithal from the owner as part payment on a particular job. The courts usually hold that, under such circumstances, the material man or subcontractor cannot apply the payment to some outside debt owing to him by the general contractor, to the prejudice of the owner. In short, the material man or subcontractor cannot knowingly divert money that justly should be applied to discharge lienable claims by crediting it upon indebtedness of the general contractor, in which

the owner has no interest, and then later enforce a lien against the property.

## Use of Land Without Right

A lessee of 320 acres of desert land in southern California was lately awarded \$1,915 damages for four months' use of the land by a highway contracting company without his consent, although the lessee paid but \$50 a year

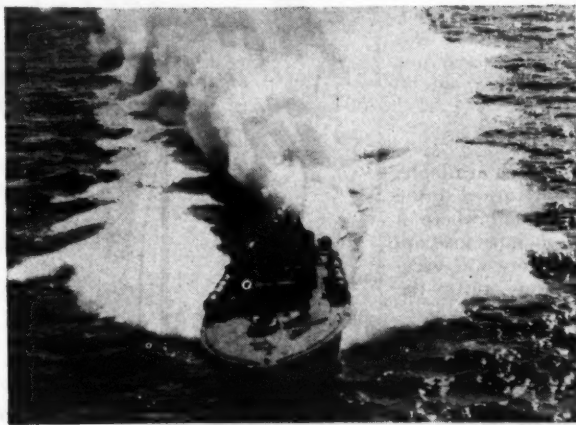
for his lease. (Keating v. Basich Brothers Construction Co., 151 Pac. 2d, 892.) All of which tends to demonstrate that it does not pay to invade private land without first bargaining for the right.

The principal use made of the unimproved bit of desert by the construction company was for a temporary road and a site for concrete mixing plants, bunkers and bins, and a bituminous plant.

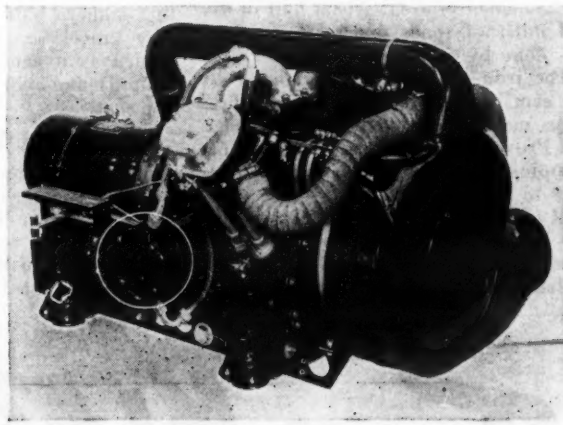


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That's a cloud of smoke behind the PT boat, billowing out to save American lives. The engine that powers the smoke generator in this vital piece of equipment was made by The Louson Division of the Hart-Carter Company, and it's equipped with a dependable WICO magneto. (Official U. S. Navy Photograph)



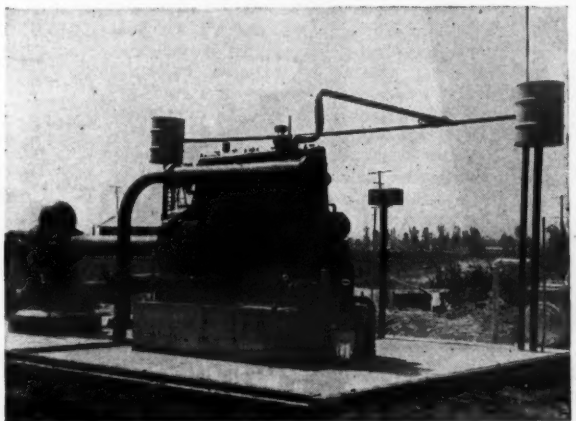
This auxiliary power unit, designed by Andover Motors Corporation, and produced by Andover and by Ranger Aircraft Engines, Division of Fairchild Engine and Airplane Corporation, is used to drive the generator that supplies power to operate flaps, bomb bay doors, automatic pilot, and other equipment on B-29 bombers. It is equipped with a WICO magneto.



Any farmer knows that there's too much work these days to have time to baby a tractor. He'll buy nothing but implements and equipment that will stand up under hard driving. Knowing how good they are, many wise farmers buy John Deere tractors—and as part of that reliability they get WICO magnetos.



A crawler tractor is made for unusually rough and tough jobs. So of course this Model H. Oliver "Cietrac" is equipped with a WICO magneto that lives up to the fine reputation and ability of the tractor itself.



Failure is a word that's completely outside the pale in a city water system. No catastrophe could be greater than failure of water supply. So the Frazier-Wright Company installed this Waukesha natural gas engine at Perris, California, and, of course, it's equipped with a WICO magneto.

**MANUFACTURERS** and buyers like these don't guess about the "heart" of an internal combustion engine. The magneto is so important, yet so comparatively inexpensive a part of the complete equipment, that they know they must have the best, whatever the cost. Yet these leading American manufacturers buy WICO's, among the least expensive of all. It is possible to build the best magnetos for these widely varying purposes at such low cost because WICO concentrates solely on magneto manufacture. WICO engineers pioneered mass production of magnetos with identical interchangeable parts, and this, too, helped put WICO out front, and helps keep it there. Wico Electric Company, West Springfield, Massachusetts.

**WICO**



## The Repair of Roads Used for Maneuvers

(Continued from page 12)

General, with 40-foot booms and 3/4-yard buckets; 9 power graders, 4 Austin-Westerns, 2 Caterpillars, 2 Allis-Chalmers, and an Adams; 6 LeTourneau 9-yard scrapers pulled by 6 Caterpillar D7 tractors; and 6 heavy-duty ditching blades pulled by 6 Caterpillar D8's. Operators for this equipment were hired by the State.

### Road Surfacing

With this equipment the state forces began surfacing the roads. In the northern half of the maneuver area the roads were surfaced with a mixture of washed gravel and iron ore, since large deposits of the latter were to be found in that region. In the southern half, the surfacing consisted of a sand-clay gravel, available locally in abundant deposits. The washed gravel and ore mixture made a better and more lasting surface than the sand-clay gravel alone, but it was too expensive to haul the iron ore from the northern to the southern half of the maneuver area. About half of the 144 miles of roads that were repaired was done by each method.

The iron ore, which has about a 40 per cent ore content and the rest clay, came mainly from deposits at Fisher and Provencal where it is found as outcroppings and was excavated by draglines to an average depth of 6 feet. A total of 120,000 cubic yards of iron ore was loaded into trucks and hauled an average of 25 miles to the roads being surfaced. The washed gravel, which con-



To reestablish drainage along damaged highways in the Army maneuver area in Louisiana, the ditches were pulled by tractor and grader.

tains about 95 per cent rock and 5 per cent silt, originated in local pits of sand-clay gravel found beneath an overburden of from 5 to 15 feet of topsoil and earth. This gravel was excavated by draglines, the sand and clay washed out, and the remaining gravel hauled an average distance of from 12 to 14 miles from railroad spurs to the road site. In the southern half of the area, the sand-clay gravel was not washed, but was hauled as it came from the local pits with a sand-clay content of about 60 per cent.

### Ore and Gravel Surface

With the Army equipment available, the state equipment was returned to the districts whence it came and where it was needed for routine maintenance operations. All of the iron ore was excavated and hauled by Army units; the

shipped in gondola cars from plants in Alexandria and south of Leesville to sidings near the jobs, where it was unloaded by clamshell buckets and cranes into trucks for transportation to the site.

The trucks hauling the iron ore dumped their loads along the center line of the graded roadbed at 10 to 12-foot intervals for a 1/4-mile stretch which was the length of road usually completed at a time. Power graders then knocked these piles down and spread the ore across 18 feet, the average width of these roads, making a layer of ore about 4 inches deep, with enough left over to form a windrow of ore on each shoulder about 1 foot high and 2 1/2 feet wide. About 1,400 cubic yards of ore was used to the mile. The washed gravel was then deposited by trucks also going down the center of the road, with their tail-gates tied open so that they spread about 10 yards of gravel per station. A 3-yard truck, for instance, unloaded in 30 feet, and a 5-yard truck in 50 feet.

(Continued on next page)

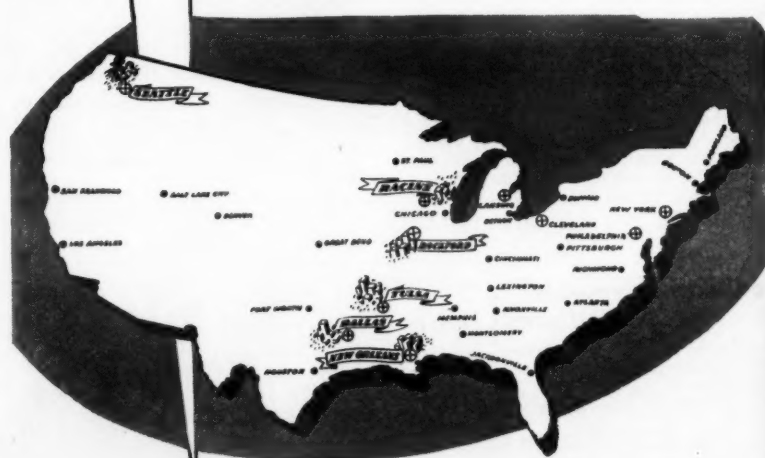
## A new Star in the TWIN DISC



The new star in their Army and Navy E flag brings a thrill of pride to every employee of the Twin Disc Clutch Company

for it is a symbol of their continued and united efforts to speed the production of products essential to our present highly mechanized war.

But while the emphasis is on PRODUCTION, another Twin Disc group . . . the local factory branches and parts depots . . . are also supplying a signal service which should not be overlooked. In spite of the difficulties of maintaining competent personnel, there have been no "fatalities" in the service map. In fact, you'll note that some additions have been made to better serve manufacturing customers and owners of Twin Disc Clutches and Hydraulic Drives in various essential industries, bringing the total field organization to 9 direct factory branches and 30 parts and service representatives. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

## TRAIL BLAZERS for 25 years

Congratulations to Edgar and Don Bittenheim and Ted Kendall on the silver anniversary of the *Contractors and Engineers Monthly* . . . it has been a great 25 years of accomplishment. They have blazed a lot of trails, and if we know them it is "only the beginning." The last quarter of a century has witnessed great progress in the construction industry . . . progress in which the *Contractors and Engineers Monthly* has had an influential part. Our best wishes for continued years of progress.



Shown here is an Inslay Excavator of 1924 vintage, one of America's first small shovels . . . a museum piece now, but a trail blazer in low cost yardage then, just as Inslay Excavators are trail blazers in low cost yardage today . . . and tomorrow.



INSLAY MANUFACTURING CORP., INDIANAPOLIS 6, IND.



# The Repair of Roads Used for Maneuvers

(Continued from preceding page)

The power graders then moved this gravel across the road to a position alongside the ore windrow. The ore windrow and the gravel were bladed back across the road to the ore windrow on the other side, getting a mixing during the move. The other ore windrow was next mixed in by moving all the material, except the 4 inches of ore on the base, back to the opposite edge of the road. At the end of these bladings, the ore and gravel were fairly well mixed and were then spread out over the 18-foot width of road to an average depth of from 6 to 8 inches. This surface is about two-thirds ore and one-third gravel. The power graders put a 3 to 4-inch crown on the road which has two 3-foot dirt shoulders. The surface was not rolled, and traffic was permitted to use the road immediately.

## Sand-Clay-Gravel Surface

The sand-clay gravel, which was used in surfacing the roads in the southern half of the area, is red in color and contains too much sand to make a high-class surfacing material. The trucks deposited the gravel in piles down the center of the road, about 10 feet apart, from where it was moved by power graders and distributed over the width of road, which averaged from 14 to 18 feet, to an average depth of 6 inches with a 3 to 4-inch crown. These roads also had 3-foot dirt shoulders. Both types of surfacing require continual maintenance with graders to keep the surface true, and the ditches must be pulled with blades so that the road-surfacing material will not clog them.

## Drainage

In addition to the grading and surfacing, the state forces also replaced 6,000 feet of reinforced-concrete drainage pipe varying in size from 18 to 30 inches, and rebuilt 127 spans, 19 feet long, of creosoted-timber bridges, using 500,000 board-feet of lumber.

By working a 10-hour day, six days a week, the state forces completed 90 per cent of the surfacing by the beginning of 1945, when the Army recalled the fleet of 100 trucks which were hauling the ore and gravel. The draglines for loading material and the blades and graders for shaping are still available, so the State is arranging to have the remaining surfacing material hauled by contract. This will include 32,196 yards of sand-clay gravel, 74,522 yards of iron ore, and 4,837 yards of washed gravel.

## Engineering Difficulties

The speed with which the road-repair work started left little time for engineering planning. The Resident Engineer assigned to the project established his headquarters at Leesville, La., a town centrally located in the heart of the maneuver area, with a pre-war population of 2,500 which because of its proximity to the Army training camps increased in a few years to approximately 10,000 to 15,000. Rooms were scarce and expensive and for the first few nights an automobile served as a bedroom until a small room renting for \$12 a week was found in a house on the outskirts of town. Quick, visual surveys of the marsh-like roads were made from a jeep loaned by the Army, and when that bogged down the engineers continued on foot.

For three months, February, March, and April, 1944, office work was carried on in a 10 x 12-foot tent set up in the middle of the Fourth Army headquarters north of Leesville. A coal-burning tent stove covered the plans with a film of soot as fast as they were turned out. Around the first of May, office space

was secured in the hallway of the local court house in Leesville. An area 35 x 12 feet was fenced off and a single overhead light furnished illumination.

The engineers on this project were given a taste of contracting, since they were responsible for the operation of 137 pieces of road-building equipment. Maintenance and repair work to the machines was all done in the open country under trees. Here the equipment was also greased and oiled. For hoisting motors out of trucks, two trees about 14 feet apart were joined by nailing 4 x 12-inch timbers to the trunks. A block and tackle hung from the cross pieces did the lifting.

Meanwhile an up-to-date maintenance building was being constructed by contract just north of Leesville on U. S. 171, and was ready for occupancy early in January, 1945. This combination office, shop, and garage has Johns-Manville corrugated Transite walls and roof and is 100 x 40 feet. Present shop equipment includes a Peerless 3-ton hoist suspended from the wood trusses, a Craftsman

saw, and several bench vises and grinders. More equipment will be added later. An office staff of five has kept a cost-accounting system on labor, material, and equipment used on the road-repair

work. About twelve men are now employed on maintenance of equipment in the shop, while ten others operate power graders, blades, etc., on the roads.

(Concluded on next page)

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## A TOUGH ROLLER FOR TOUGH JOBS

Pierce-Bear 2-5 Tons  
Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

Manufactured by

**H. W. LEWIS EQUIPMENT COMPANY**

431 Houston Avenue  
SAN ANTONIO 3, TEXAS  
Phone, Garfield 6137

# There's a difference in HD oils

MANY OILS pass the tests that have been set up to determine an oil's suitability for use in Diesel engines or in gasoline engines under heavy-duty service. But that does not mean that all of these HD (heavy-duty) oils are the same.

Methods of testing HD oils are well established. They rate the qualities of an oil such as: oxidation resistance, detergency, corrosion, and other items listed in the first column of the table at right.

All HD oils are not the same because some oils excel in one or more qualities but are only passable in others. The table at right compares Stanolube HD's rating in all of these qualities with a number of other HD oils. The ratings given in the table are the result of many tests, under exactly similar conditions, for all the oils. Stanolube HD consistently rates *higher* in *more* of the qualities than any other tested oils.

What does this mean in actual service? Just this. Under present gasoline conditions and the heavy service demands on equipment, you need the greatest possible protection you can get to keep down varnish and other engine deposits, to guard against excessive wear on engine parts, bearing corrosion, or breakdowns caused by oil system failures. Stanolube HD gives this protection to a greater degree than other HD oils.

Find out how this greater protection can cut maintenance and replacement costs in your fleet. A Standard Oil Automotive Engineer can help you make this test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.

## Comparison of Stanolube HD with other oils

OIL QUALITY	ENGINE TEST USED	Stanolube HD	Other HD Oils			Conventional Motor Oil
			A	B	C	
Oxidation Resistance	36-hour Chevrolet Piston Varnish	9	9	8	5	
	36-hour Chevrolet Engine Sludge	10	9	8	6	
	500-hr. G.M. Diesel Piston Deposits	10	9	8	4	
Detergency	Caterpillar 1-A Piston and Top Ring Deposit	9	9	8	4	
	500-hr. G.M. Diesel Port Fouling	10	10	8	4	
	500-hr. G.M. Diesel Filter Deposits	10	10	8	3	
Bearing Corrosion Resistance	Caterpillar Hot Box	10	9	10	6	
	36-hr. Chevrolet	10	9	10	6	
	500-hr. G.M. Diesel	10	10	10	7	
Load Carrying Ability	Caterpillar Scratch Test	10	10	10	6	
Total Rating All Tests		98	94	88	51	

Rating Explanation: 10—Excellent plus—Free from any deposits, corrosion, or scuffing. 9—Excellent. 8—Good. 7—Fair. 6 (or below)—Failure to pass—Heavy deposits, extensive corrosion or scuffing.

This table above compares Stanolube HD's rating in heavy-duty oil qualities with (A) the best of 10 other HD oils that passed the tests, (B) the lowest rated oil of the 10 that passed and (C) the rating of a high quality regular (not HD) motor oil. Such an oil is not usually subjected to these tests and is included here merely to indicate the severity of the tests by this comparison.

heat-proofed  
**Stanolube HD**

Buy more War Bonds

**STANDARD OIL COMPANY (INDIANA)**

STANDARD  
SERVICE



## The Repair of Roads Used for Maneuvers

(Continued from preceding page)

Because of the constant use which the state roads in this area will receive from the numerous Army establishments, this maintenance plant will be operated on a permanent basis even when this project is completed. Roads of this type need constant maintenance, especially with the heavy wear they receive from mechanized war equipment rolling over them.

The financing of these projects, amounting to \$1,629,219, is part of the Army Fund made available to the Public Roads Administration to repair roads in the Louisiana maneuver area.

### Other State Roads

While this repair work to gravel-surfaced state roads was under way, other highways were being constructed or reconstructed in the maneuver area. Some of these reconstruction jobs were known as reimbursable projects, that is in some cases where the Army was responsible for the road failure, the Louisiana Department of Highways, with the cooperation of the Public Roads Administration, awarded contracts for the rebuilding of the roads, paid the contractors, and will later present a claim to the Government to cover the cost of construction. This damage was distributed over 524 miles and the approximate cost to repair and restore the roads to their original condition is \$3,500,000.

On some of the new construction, contractors had some painful experiences with the Army. One contractor had just finished sodding the shoulders of a new

concrete road when a convoy of Army trucks came along, pulled off on the fresh shoulders, and cut ruts 2 feet deep in the soft soil. Another contractor had completed a new bridge, and the engineers were writing the letter of acceptance to Department of Highways headquarters when a heavy tank rumbled down the highway and over the bridge, ripping off the entire length of hand-rail on one side as it went. Another bridge contractor had some valuable bridge timbers taken by the Army to use in one of the simulated battles. He was forced to suspend operations while he hustled around to get a priority and then replace the material. Soldiers in trucks and jeeps ran up and down shoulders and slopes, rutting and eroding the soft earth banks which were never meant to withstand motor traffic. Drainage ditches newly dug were caved in from being straddled by Army trucks driven along them. One concrete road, only recently poured, had been barricaded by the contractor and guarded by military police who had been detailed to keep Army traffic off that section of road during maneuvers. A General happened along, however, and in his zeal to gain an advantage for his side in the maneuver battle, ordered the military police away and drove his convoy over the new concrete which he thought had been cured enough anyway.

Before the roads were accepted by the State, the contractor had to replace the loss or damage caused by the Army and then later present a claim to the Government for the loss that he suffered.

### Parish Roads

The parish roads, the secondary-road system of Louisiana, were also rendered impassable throughout the maneuver area. Surveys of the damages were made

by State Department of Highways engineers and the Police Juries, the governing bodies of the parishes. Repairs to these roads are being done by contract, with from 100 to 175 miles of roads in one contract, at a cost of about \$900 a mile, including grading, drainage, small bridge structures, and gravel surfacing. The roads vary in width from 12 to 24 feet and are not improved or bettered in any way, only repaired. This damage was in Sabine, Vernon, Natchitoches, Rapides, and Beauregard Parishes and consisted of 1,577 miles. Engineering and contracts for the work amounted to \$1,455,000. The financing of these projects is a part of the \$5,000,000 fund which Congress appropriated to repair roads damaged by Army maneuvers in Tennessee, Texas, and Louisiana.

### Personnel

The work of repairing the 235 miles of state surfaced roads in five parishes was done by the Louisiana Department of Highways, of which R. B. Richardson is Construction and Maintenance Engi-

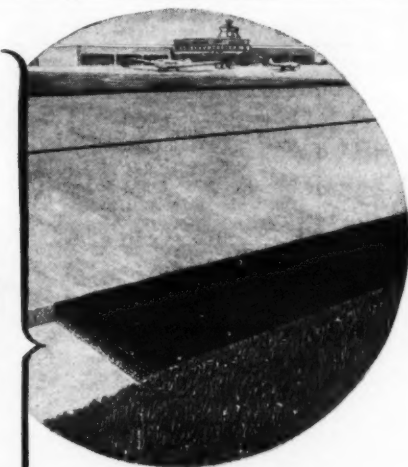
neer. The greater part of the maneuver area lies in District No. 3 which is directed by J. C. Watson, District Engineer. C. C. Edwards, Jr., is District Construction Engineer and J. C. Fridge was Resident Engineer on the project.

### Kidde Co. Purchases Youngstown Miller Co.

The capital stock of the Youngstown Miller Co., Inc., formerly of Sandusky, Ohio, manufacturer of oil reclaimers, has been purchased by Walter Kidde & Co., of Belleville, N. J. Production for orders on hand will continue under the direction of F. L. Gerin, Vice President and General Manager.

Other officers of the new Kidde subsidiary are John F. Kidde, President; Harold A. Cartier, Vice President; C. Crosby Hiss, Secretary; and William Deyerberg, Treasurer and Comptroller. R. E. Strobel will continue as Sales Manager. The main office of Youngstown Miller will now be located at 675 Main St., Belleville, N. J.

## Bituvia Marginal Protection for Airport and Highway Pavements



● Both flexible and rigid pavements are vulnerable to failure at the edges. A BITUVIA surface treatment will protect the edges of airport runways and highways from moisture, insuring long service and low maintenance costs.

### OTHER BITUVIA APPLICATIONS

#### BITUVIA ROAD MIX

For economical mixed-in-place construction.

#### BITUVIA COLD PATCH

For spot patching and preparation of stock pile patching mixtures.

#### BITUVIA RETREAD

For waterproofing cracks and giving new, skid-resistant surface.

#### BITUVIA HOT PLANT MIX

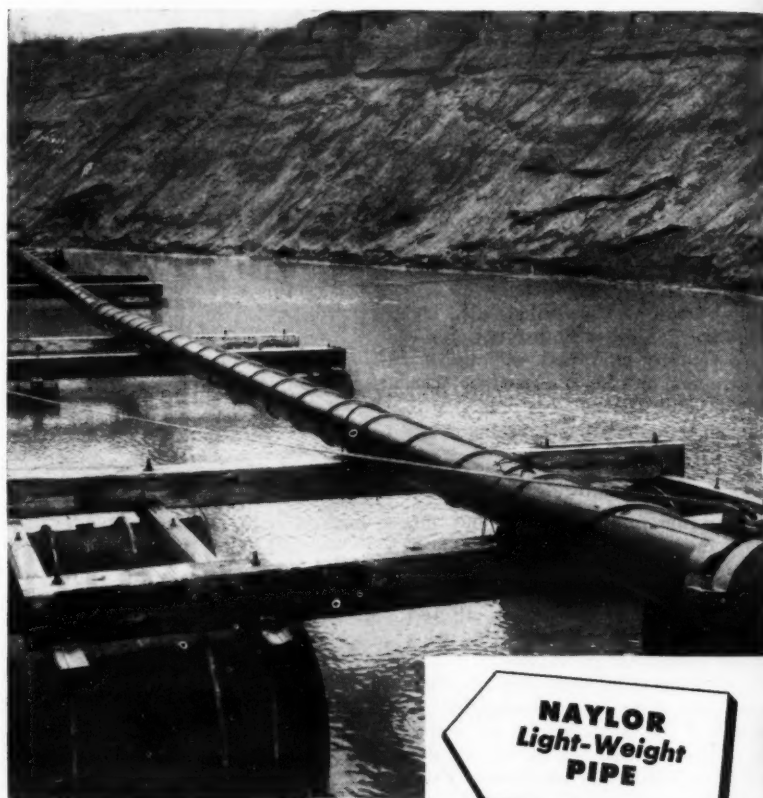
For airport runway base and wearing course.



Handy pocket-size Bituvia manual  
will be sent on request.

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2515 S. DAMEN AVENUE, CHICAGO, ILLINOIS 300 FIFTH AVENUE, NEW YORK, N. Y. ST. LOUIS PARK, MINNEAPOLIS, MINN.  
SEVENTEEN PLANTS TO SERVE YOU



**NAYLOR  
Light-Weight  
PIPE**

## GUIDE-POST for CONTRACTORS

## In Search of Better Pipe Performance

Naylor Pipe can serve you best in the following applications:

High and low pressure air lines	De-watering and drainage pipe
High and low pressure water lines	Sand and gravel conveying lines
Ventilating pipe	Irrigation pipe
Cement pumping pipe	Well-point systems
Dredging pipe	Composite piling
Hydraulic sluicing pipe	Exhaust and intake

This light-weight pipe is built to handle jobs normally requiring heavier-wall pipe. Its exclusive Lockseam Spiralweld structure makes it stronger, leaktight and safer than ordinary light-weight pipe. Its accurate diameter, concentric ends and advanced-type coupling methods speed installation and cut costs. And, its high-salvage and re-use value contributes to its increasing popularity with contractors.

Sizes: 4" to 30" in diameter; lengths up to 40 feet; thickness from 14 to 8 gauge; all types of fittings, connections and fabrication.

### NAYLOR PIPE COMPANY

General Office  
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New York Office  
350 Madison Avenue • New York 17, N. Y.

**NAYLOR LOCKSEAM  
SPIRALWELD PIPE**





From Cpl. Glueck, ETO  
"Well, can you beat that! He has a scrub-lady in nights!"

excepting the ancient Romans. They had thousands of miles of concrete highway systems, much like ours today, except that they traveled over them in chariots instead of railway trains and automobiles . . ."

What, no tracks?

### Blaw-Knox Official Will Resume Post in France

Nicholas Gerten, formerly Managing Director of the Compagnie Francaise Blaw-Knox, a subsidiary of the Blaw-Knox Co., Pittsburgh, Pa., is planning to return to his post at Chauny, Aisne, France, to resume his work in that organization. The French subsidiary was formed in 1928 and Mr. Gerten was director of operations from 1939 until he was obliged to leave when the Germans occupied France. After Mr. Gerten's departure, his French associates continued with the manufacture of construction machinery and steel products, part of the time under German supervision.

The plant, located about 70 miles north-east of Paris, is reported to be in good condition.

Mr. Gerten has been associated with Blaw-Knox since 1927, starting as Sales Manager of the Blaw-Knox International Corp. in New York. He made his home in France from 1932 to 1940, first super-

vising the company's interests in continental Europe and more recently directing the plant in France. During the past four and a half years he has carried out various assignments for Blaw-Knox in this country.

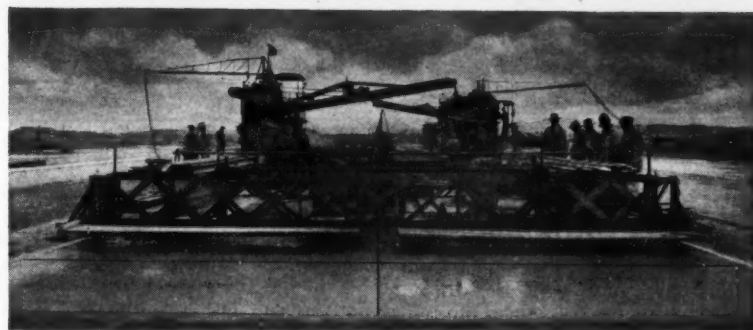
Buy more War Bonds—and keep them!

### Nice Work, America!

The following is quoted from an editorial in the Columbus, Ga., *Enquirer* of February 14, 1945:

"We Americans believe in road building more than any other nation ever did,

## Here's Why Road Men Prefer 'FLEX-PLANE' Dummy Joints



### Good Timing

With a high speed 'FLEX-PLANE' joint installing machine dummy joints are put in at 'just the right time'—every time—for best results . . . no waiting . . . no delays.

### Uniformity

There is consistent uniformity of joints . . . good alignment and same depth whether you install one or a hundred joints.

### Always Ready

When the concrete is ready, the machine is ready . . . this relieves the contractor of constant supervision.

### Speeds the Job

'FLEX-PLANE' joint installers permit close spacing of transverse joints—it never gets behind.

### Better Joints—Better Roads—Seldom any Maintenance

Low spots along the joints are eliminated when a 'FLEX-PLANE' machine is used to cut the groove—thus eliminating filling in with excess matrix or dry materials.

Write for details on the  
'FLEX-PLANE' Joint Installer.

**FLEXIBLE ROAD JOINT MACHINE CO.**  
WARREN, OHIO

## ELECTRICITY



**WHEN YOU WANT IT  
WHERE YOU WANT IT**

• For Operating Power Tools • Flood-lights • Field Repair Shops • Service Trucks • Paving Machines • Power Shovels • Earth Moving Equipment, etc.

There's an economical "U.S." unit for every construction-work need. Engineered by men with practical, out-in-the-field experience. Built to take every punishment—and operate faithfully for long continuous hours. Sizes from 500 watts to 15 KW. Skids, rings, porter bars, and trailer mountings available.

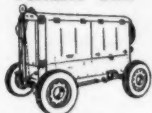
"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 75 KW—for stand-by, continuous duty, battery-charging, and portable uses. Write for literature, stating type of unit and capacity required.

**UNITED STATES MOTORS CORP.**  
554 Nebraska Street Oshkosh, Wisconsin  
Factory representatives strategically located throughout U. S. A. and Canada.

**"U.S." ELECTRIC PLANTS**



Portable Unit



4-Wheel Trailer



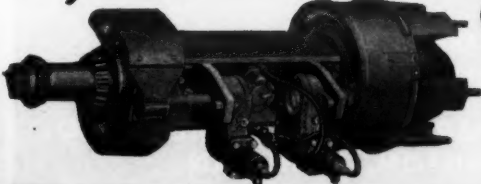
2-Wheel Trailer

## WITH LOADS LIKE THIS...



YOU NEED  
SAFE, SURE

**Hydraulic Brakes**



CONTROLLING a massive trailer, fully loaded as this one is, demands reliable brakes that really stop. The new Jahn hydraulic brake application for heavy duty trailers provides smoother, faster braking action, even under the most punishing burdens, with positive, equal brake pressure on all wheels. Uneven terrain has no effect on them—full axle oscillation can take place without any reduction in braking efficiency. There is no possibility of partial application or dragging of brakes, never any added resistance for the prime mover to overcome.

Thoroughly tested in actual service, all Jahn heavy duty trailers are now available with these powerful, fast-acting hydraulic brakes. Make sure your postwar trailer has this added safety factor. Write today for details.

**C. R. JAHN COMPANY**

1347 WEST 37th PLACE, CHICAGO 9, ILL.

Capacities from 5 to 100 tons . . .  
Any axle or wheel combination

## CUMMER ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal  
Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

**THE F. D. CUMMER & SON CO.**

EAST 17th & EUCLID  
CLEVELAND 15, OHIO





S/Sgt. Albert T. Miller, C&E Monthly Art Director, (in helmet) supervises the construction of Engineer barracks in the Philippines.

### Report From Pacific By a Staff Member

Albert T. Miller, for a number of years in charge of the Art Department of CONTRACTORS AND ENGINEERS MONTHLY, by due process of Selective Service became a member of an Engineer Topo Unit attached to Headquarters, Eighth Army Engineers, and gravitated to the Philippines. His most recent letter, dated March 5, 1945, enclosed the accompanying photograph showing him, in the helmet, in the role of Construction Foreman.

He calls attention to the "modern" equipment used, U. S. Army machetes and native bolos. No nails were used in the construction of the building in the

foreground, but the frame work has already withstood a typhoon-proportion wind and rainstorm. The tent is the workshop and office. The big coconut log in the foreground was cut by the natives with just a bolo knife. A two-man saw was available but the natives preferred their bolos.

### New Worthington Dealers

Six new distributors have been appointed by the Construction Equipment Department of Worthington Pump & Machinery Corp., Harrison, N. J., to handle regional sales of Blue Brute portable compressors and air tools. They are: Atlas Equipment Corp., 722 Oliver Bldg., Pittsburgh, Pa.; Carolina Tractor

& Equipment Co., Hillsboro St. Extension, Raleigh, N. C.; Chicago Construction Equipment Co., 13912 So. Halsted St., Chicago 27, Ill.; Lakeshore Machinery & Supply Co., 400 W. Laketon Ave., Muskegon, Mich.; Phillippi-Murphy Equipment Co., 360 Hoover St., N. E., Minneapolis, Minn.; and Olson Mfg. Co., 2223 Fairview Ave., Boise, Idaho.

### LaPlant-Choate Names General Sales Manager

S. L. (Sid) Myers has been appointed Vice President and General Sales Manager of LaPlant-Choate Mfg. Co., Inc., maker of dirt-moving and allied equipment, Cedar Rapids, Iowa. Mr. Myers' connection with the company dates from 1923, when he started as a helper in the machine shop. Later he filled the positions of Traffic Manager, Purchasing Agent, and Export Sales Manager successively, and was responsible for government sales. He was advanced to the position of Vice President in 1943. Mr. Myers succeeds H. H. Buchanan.

### Resurfacing Program Started in Missouri

Over 100 miles of U. S. 40 and 66 in Missouri are to be resurfaced in 1945 at an estimated cost of \$1,250,000, provided Federal agencies permit the work. According to a report from the Missouri State Highway Department, these two highways have many sections which are breaking down under the impact of heavy traffic. Consequently this work is vitally necessary if satisfactory traffic conditions are to be maintained until reconstruction can take place.

The work will consist generally of resurfacing sections of old concrete on Routes 40, 61 and 66 in Lincoln, St. Charles, Warren, Franklin, Crawford, and Phelps Counties. It will involve placing from 150,000 to 200,000 tons of asphaltic concrete and will be done by contract during the 1945 construction season, unless Federal regulations regarding the availability of materials, equipment, and labor prohibit such procedure.

## 10,000,000 cu. yds. of Mass Concrete Placed by JACKSON VS-4s On TVA Dams Alone



VS-4s IN USE ON  
GRAND COULEE DAM

### JACKSON HEAVY DUTY INTERNAL VIBRATOR



Contractors eyeing the many dam projects proposed as part of the postwar construction program can rely on JACKSON VS-4 Mass Concrete Vibrators as the outstandingly efficient machines for thorough and speedy compaction of the harsh and stiff mixes used in this type of concrete construction. JACKSON VS-4s are noted for dependability and low cost maintenance, under practically continuous operation...

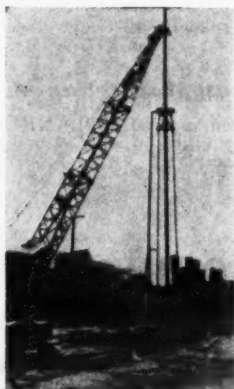
Big jobs where JACKSON Mass Concrete Vibrators have made outstanding records include TVA Dams, Grand Coulee, Madden, Pine Canyon (Samuel B. Morris), Conchas and Tygart Dams, to name just a few. Experienced contractors and engineers on the huge postwar hydro-electric and reclamation programs will select JACKSON VS-4s because of their performance records.

THERE IS A RIGHT JACKSON  
CONCRETE VIBRATOR FOR EVERY JOB

ELECTRIC TAMPER & EQUIPMENT CO.  
LUDINGTON, MICHIGAN

### Griffin High Pressure Jetting

### JET DOWN OR JET UP ANY TYPE OF PILE FOUNDATION with the GRIFFIN SYSTEM



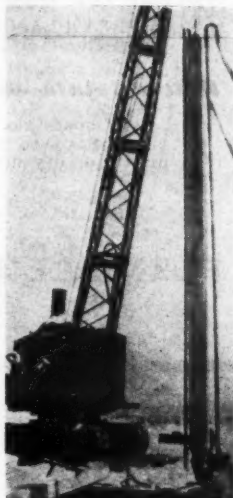
STEEL

Jetting steel piles with two jet pipes and special rig for accurate location.



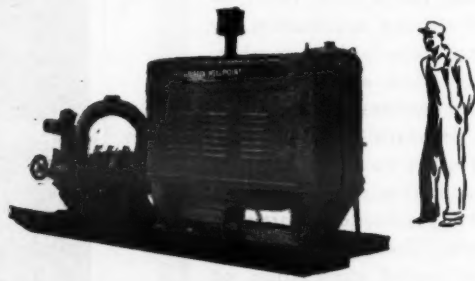
WOOD

Wood pile clusters along new boardwalk at Coney Island. Single jet used.



CONCRETE

Concrete Piles with two jet pipes for 25' penetration through sand and clay.



### FOR SALE AND FOR RENT

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GRIFFIN WELLPOINT CORPORATION



## Uncle Sam's Levees Control Our Floods

(Continued from page 6)

cessity, and the subject was not discussed very much. We have come a long way since then in both fields, as witness our current appropriations and our current literature.

Flood control achieved respectability with the first flood-control act, that of 1917. Thus the birth of CONTRACTORS AND ENGINEERS MONTHLY some three years later occurred in the very early years of Federal flood-control activities as such.

### The Levees of 1920

It may be of interest to glance back briefly at the year 1920. The so-called 1914 levee grade had been adopted following the record-breaking floods of 1912 and 1913. It was 3 feet above their estimated confined flows. The crevasses had been closed, and much of the levee line had been brought to the new grade by the combined efforts of local interests and the Government. Its content was 350,000,000 cubic yards. The flood-control act had authorized appropriations aggregating \$45,000,000, of which amount \$19,340,000 had already been made available. The appropriation for all activities of the Mississippi River Commission for the fiscal year beginning July 1, 1920, was \$6,670,000, of which about \$3,000,000 had been allocated to levees. Under the terms of the flood-control act, local interests were required to furnish the rights-of-way, and in addition at least one-third of the construc-

tion cost. Thus the \$3,000,000 Federal funds allocated to levees represented a total potential expenditure of not less than \$4,500,000 for construction activities after being matched by local funds in the ratio prescribed.

When the levee boards had more money than the Federal government could match on the minimum basis of local participation, they were at liberty to increase their contribution beyond the one-third or to build stretches of levee entirely at their own expense. When the latter course was followed, they usually built to the grades and cross sections established by the Commission. In the year ending May 31, 1920, the levee boards contributed \$1,572,000 for construction. In addition, they placed about 2,200,000 cubic yards independently of the Government. They let their work by contract. The Commission was performing a considerable portion of its construction by hired labor. It had been for some time actively pioneering in the effort to develop and popularize large-capacity earth-moving equipment, and owned twenty-six levee machines, several of which incidentally are spending their declining years grading the river's banks for revetment operations.

The contractors, of course, had seen the signs of the times, and with characteristic adaptability and enterprise were quick to take the initiative in carrying on the development to its present degree. A glance at the list of contracts in force as of August, 1920, discloses such familiar names as Walter L. Lee, Geo. F. Ramsey, J. A. Burt, Roach-Stansell-Lowrance Bros. & Co., H. B. Blanks, Rogers Bros., C. O. Chambliss, Hercules Co., Rominger & Beauchamp, E. H. Jackson, W. C. Mullen, Grasser Con-

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## LINN HAFTRAKS WITH FULLY ENCLOSED OR OPEN CABS



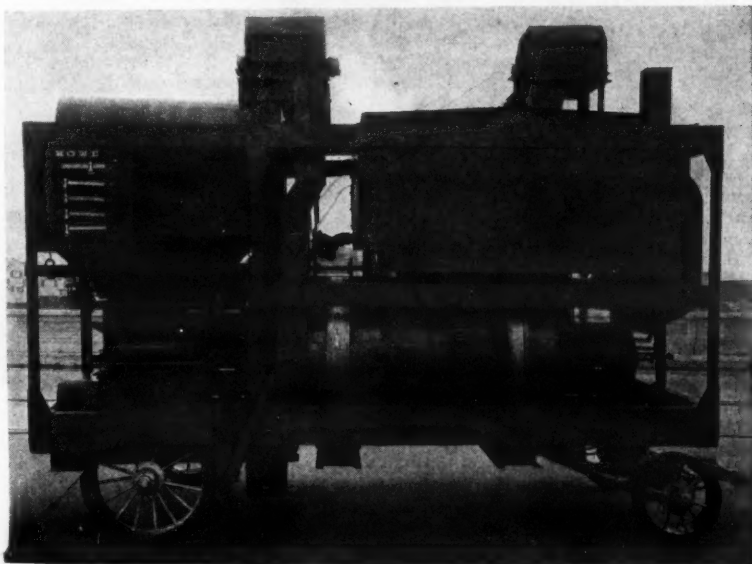
**T**HERE is a type of cab and body for any service, in any climate. The built-in strength and balance, with ample power, permit the rugged Linn Haftraks to carry their loads in all kinds of weather—the world around, the year around. Linn Haftraks and Traktrailers are built from 5 to 50 tons capacity. Send for catalog.

### THE LINN MANUFACTURING CORPORATION

Morris New York

DESIGNERS AND BUILDERS OF OFF-THE-HIGHWAY VEHICLES FOR 29 YEARS.

## HERE IS A COMPLETE ASPHALT PLANT!



### Designed Especially for Handling Repair Work Efficiently



**FLUIDOMETER**  
Modernize your Asphalt Plant by installing a Fluidometer Automatic Metering System.

● This H & B Patch Plant meets every requirement for speedy, economical repair work. May be set up as a stationary plant on steel columns, or used as a mobile unit—wheel mounted as shown. Will efficiently produce material to meet any standard hot or cold mix specifications. Capacity, 3 to 5 tons per hour. Gasoline or electric power unit optional. Rugged, double-shaft pug mill mixer. Collapsible hoist. SKF bearings throughout. Portable units have rubber-tired wheels and a short turning radius—conforming to highway and street regulations.

Bulletin R-402, giving complete information and flow diagram, will be sent on request.

**HETHERINGTON & BERNER INC.**  
731 KENTUCKY AVENUE • INDIANAPOLIS 7, IND.

*Hetherington & Berner*  
FOR BEST RESULTS... BATCH MIX — HOT MIX

## HENDRIX *Lightweight* DRAGLINE BUCKETS

**DO THE JOB**  
...Easier...Faster  
...Cheaper



$\frac{3}{8}$  to 30 Cubic Yards

- ★ 20 to 40 per cent lighter than other buckets, type for type.
- ★ All welded construction for greater strength and durability.
- ★ Manganese steel chains, fittings, and reversible tooth points.
- ★ Full pay load every trip, even in wet diggings.
- ★ Three types...light, medium, and heavy duty.

WRITE OR ASK YOUR DEALER FOR DESCRIPTIVE LITERATURE

DESOTO FOUNDRY INC. • MANSFIELD LOUISIANA

Pour out your might for . . .  
the mighty 7th WAR LOAN



## Flood Control

(Continued from preceding page)

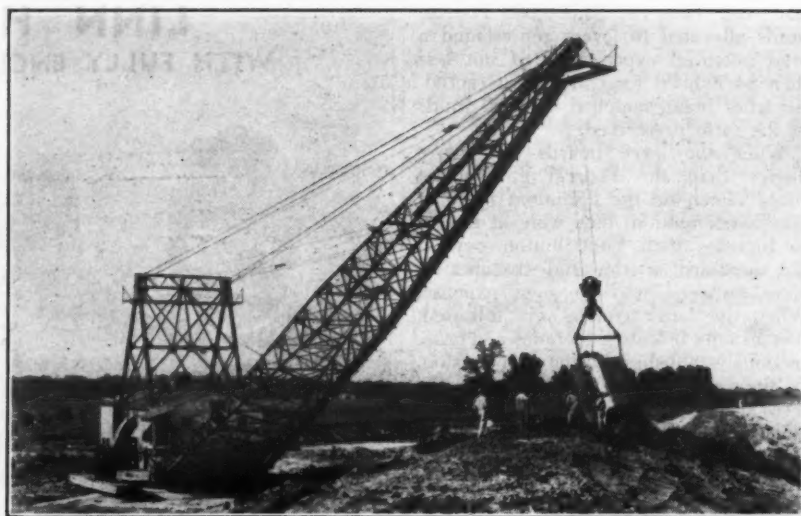
tracting Co., F. C. Constant, Dameron, White & Co., Lower Coast Contracting Co., P. M. Adema, O. O. Ogden, Don B. Hearin & Son, and Lester Alexander.

Unit prices for the larger items (300,000 to 600,000 cubic yards) ranged generally from 22 to 38 cents in the reach between Cairo and the Arkansas, with an occasional 45 cents; from 23 to 30 cents for the larger items between the Arkansas and Vicksburg; and from 9½ to 23½ cents below Vicksburg. The prices reflected differences in borrow-pit restrictions, river regimen, and climate, much as they do today, and suggest that even in that innocent age the profit motive was not altogether absent.

### Effect of 1927 Flood

Under the combined efforts of the Mississippi River Commission and local interests, some 11,000,000 or 12,000,000 cubic yards a year were being added to the levee system. In 1927 a flood far transcending all past experience swept down the river and aroused the nation to a fuller appreciation of the magnitude of the problem that confronted it. Flood control took a new lease on life. The nation faced its responsibilities squarely.

Flood control of the lower Mississippi had been tried as an undertaking of local levee districts and as such it had failed. It had been tried as a quasi-Federal enterprise and this had failed. Yet if people were to continue to live in the alluvial valley with a manner of life in any measure approaching the traditional American standard, and if the potential wealth of a vast area of some 30,000



For long reaches and fast economical dirt-moving on the levees, the large Monighans have set an enviable record. This machine, with a 10-yard bucket, is shown building a levee on the Atchafalaya River, La., in September, 1940.

square miles of fertile bottom lands was to be developed, dependable flood control was an absolute essential.

Clearly the problem was national in scope, and the job was too big and too important for divided responsibility or for the limitations as to grade and rate of construction progress which reliance upon the local purse for a third of the construction would necessarily continue to impose. The Federal government took over. Local participation was reduced to providing rights-of-way and ordinary maintenance after construction. An Administration not greatly given to reckless spending slackened the Federal purse strings in truly heroic fashion. A grade line that no longer had to temporize but could be based upon the maximum flood deemed probable was

adopted and the Commission went to

work in earnest.

The great bulk of the work was awarded by contract as a matter of policy. Hired labor operations declined to the small fraction which, because of some local peculiarity or uncertainty, it was found impractical to award by contract.

### Dirt Moving on Grand Scale

The swinging booms of draglines and the imposing towers of cableway machines became commonplace features of the landscape. Mechanized hauling equipment began seriously to contest the field, and an occasional suction dredge added its contribution. Annual appropriations, which had been deemed adequate if not liberal at \$6,000,000 to \$7,000,000 in 1920, stepped to \$20,000,000, \$30,000,000, and \$35,000,000. And the 1920 annual yardage placement of some 10,000,000 to 12,000,000 crested impossibly to 125,000,000 for the year ending June 30, 1934. The 1914 grade gave place to the 1928 grade. The Boeuf and Eudora floodway projects were sub-

(Concluded on next page)

## MECHANICS Roller Bearing UNIVERSAL JOINTS



### Help Keep Road Building Machines ON THE JOB

Because MECHANICS Roller Bearing UNIVERSAL JOINTS require infrequent lubrication, they help road machines avoid frequent stops for this purpose. Because MECHANICS joints are all-weather sealed against dirt and moisture, they help avoid delays caused by break-downs. Let our engineers help you design added dependability and increased utility into your new or improved earth-moving machines — with sturdy MECHANICS Roller Bearing UNIVERSAL JOINTS.

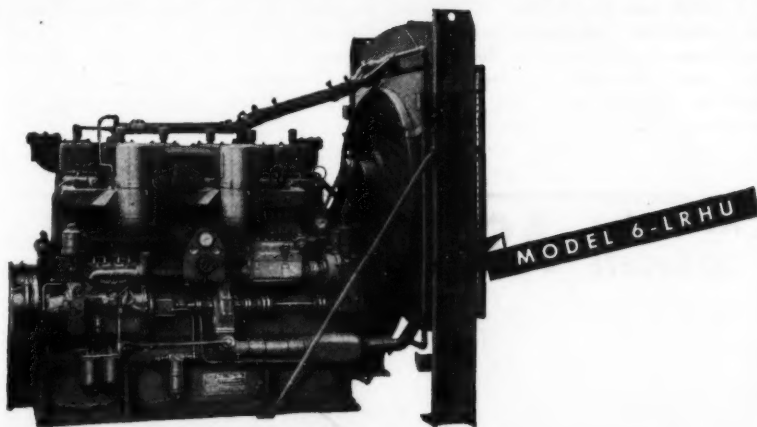


**Mechanics Universal Joint Division**

BORG-WARNER CORPORATION 2026 Harrison Avenue Rockford, Illinois



## WAUKESHA HESSELMAN *Oil* ENGINES



● In wartime every Waukesha Engine is a war-work engine. All Waukesha production is for the use of the armed forces. Until the war is won, Waukesha postwar engine designs are not being shown.

But peacetime models are on the way. New advantages and greater user conveniences will make the new peacetime Waukesha-Hesselman the world's most wanted diesel-oil engine.

After the war the fuel problem for engine-driven equipment will be serious unless it is Hesselman powered. Because it burns those widely sold Nos. 1, 2 or 3 domestic furnace oils as well as high-speed diesel fuels... either high or low cetane... Hesselman will be the contractor's first choice for country-wide use. And a Hesselman may be converted from fuel injection to carbureted gas or gasoline without changing a single major part. No compression ignition Diesel can be converted from fuel oil to gas or gasoline so quickly, or easily. Even gasoline injection is possible with the Hesselman.

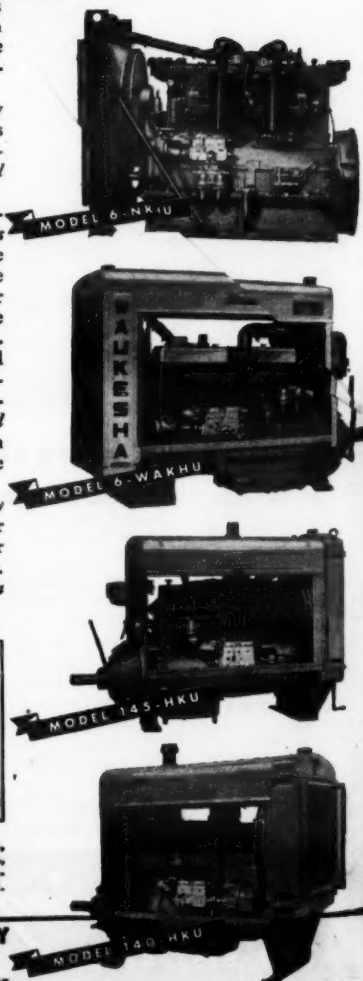
● And Hesselman's electric and positively timed ignition and lower pressures give easier starting, less shock load, longer life, lower upkeep than with any other diesel-oil engine.

For your future engine needs, consult Waukesha now. Get Bulletin 1341.

Power Unit Model	No. of Cyls.	Bore and Stroke, In.	Displ. Cu. In.	Speed RPM
*130-HLU	4	4 x 5	251	1000-2000
*VRZHU	4	4½ x 5½	353	1000-1600
*140-HKU	6	4½ x 5½	525	1000-1800
*145-HKU	6	5½ x 6	779	1000-1800
6-WAKHU	6	6¼ x 6½	1197	800-1600
6-NKHU	6	7 x 8½	1962	750-1200
6-LRHU	6	8½ x 8½	2894	750-1050

\*These Hesselman Engines are true multi-fuel engines, and can be converted to burn natural gas or gasoline, with no internal changes. The others can also be converted provided manifolds for carbureted fuels are applied.

**WAUKESHA MOTOR COMPANY**  
WAUKESHA, WISCONSIN  
NEW YORK • TULSA • LOS ANGELES





# Flood Control

(Continued from preceding page)

sequently abandoned in favor of complete confinement between the Red and the Arkansas, and the 1928 grade has now yielded to the 1941 grade. The 8-foot crown and banquette cross section of 1920 have become the 25-foot crown and the flat slopes of the massive present-day structure, which lifts itself above what we believe to be the maximum flood we may reasonably expect ever to have—a flood some 20 per cent greater than even the record-breaker of 1927.

Since 1920, we have placed some 986,000,000 cubic yards in the expanded levee system, and we estimate that 207,000,000 are still required. Actually, this will not be the end, in all likelihood, even in the lower Mississippi Valley; for as it becomes more secure against floods, it becomes richer, and with greater riches will come insistence upon still greater security. Even now there is authorized for post-war undertaking a project for protecting the river's banks and improving its depths—partly in the interest of navigation, largely in the interest of flood control and greater security to the levee system—estimated to cost \$200,000,000. Of this sum, about \$165,000,000 is estimated to be required for bank protection, of which it is planned to have as much as possible built by contract. A new field of flood-control work is thus opening on the Mississippi.

Moreover, since 1927 there have been other floods on other streams which have far exceeded the powers of the locally constituted organizations to combat. The ensuing disasters have quite naturally had the effect of still further arousing the national consciousness of the flood-control problem and have led to the assumption by the Federal government of its solution in ever widening fields and by a diversity of methods. Major drainage problems are now recognized as not dissociable from flood control.

## Post-War Projects

In 1936 the first "general" or "omnibus" flood-control act was passed; covering the country as a whole, and eight years later the 78th Congress authorized the post-war construction of flood-control projects throughout the nation whose cost will probably approximate

\$1,000,000,000. Flood control, apparently approaching its end in 1920, today is experiencing its second renaissance. What the more distant future holds in store one cannot of course foretell; yet it seems reasonable to conclude that so long as the winds blow and the rains descend, floods will come and men will build ever higher and ever sturdier ramparts to confine them.

## Accident Prevention

### Awards Made by AGC

The Associated General Contractors of America has announced the winners of awards in its 1944 Accident Prevention Contests. In the Heavy Construction Division, Newbery Electric Corp., Los Angeles, Calif., won the trophy. The runners-up were The Fluor Corp., Ltd., Los Angeles, Calif., and McAtee & Heathe, Spokane, Wash.

In the Highway Construction Division, A. J. Baltes, Inc., Norwalk, Ohio, won the trophy, and Thorpe Construc-

tion Co., Akron, Ohio, and Bellefontaine Development Co., Bellefontaine, Ohio, were runners-up.

In the Accident Prevention Contest restricted to New England contractors, H. P. Cummings Construction Co., Ware, Mass., was the award winner, with C. W. Blakeslee & Sons, Inc., New Haven, Conn., and W. H. Ellis & Son Co., East Boston, Mass., runners-up.

## TRANSITS and LEVELS HEADQUARTERS for REPAIRS—any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalog CE-15 of Engineering Instruments, Engineering Field Equipment and Drafting Room supplies.

### WARREN-KNIGHT CO.

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## How to Get Rid of the SEAT-FAG "BUG"

Every piece of riding equipment that is equipped with an old-fashioned hard iron seat carries with it a seat-fag "Bug" that causes costly work-loss through reduced efficiency of the operator.

You can get rid of this seat-fag "Bug" by equipping your power shovels, cranes, graders, bull-dozers, tractors and other heavy-duty riding equipment with

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**TRANSLODE** Expansion and Contraction Joints have been giving excellent load transfer performance on thousands of miles of American pavements since 1932. Today's improved and simplified design retains the continuous base which makes installation easier and seals the joint against the infiltration of dirt from the soft subgrade. The weight of the joint has been reduced while the rigidity has been increased to make handling and finishing easier.



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Material	dredged ocean sand
Job	Idlewild, New York, Airport
Contractor	Circle Construction Corp.



### 16,000 FEET ONE WAY

Hourly pay yds. per unit	25
Tournapulls in fleet	11
Material	wet pit-run gravel
Job	sub-base for Illinois Hwy.
Contractor	Raemisch-Madden Co.



### 4,000 FEET ONE WAY

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